

CUL - H05477 - 6 - C165621

ISSN-2278-9685

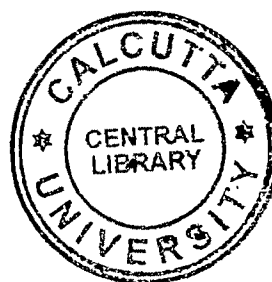
JOURNAL OF THE DEPARTMENT OF MUSEOLOGY

Volume 10

2014

Editor

MAHUA CHAKRABARTI



Department of Museology
UNIVERSITY OF CALCUTTA
Kolkata

Advisory Committee

Professor Suranjan Das, Vice Chancellor, University of Calcutta

Professor Dhrubajyoti Chattopadhyay, Pro Vice Chancellor (Academic), University of Calcutta

Professor Mamata Ray, Pro Vice Chancellor (Business Affairs & Finance), University of Calcutta

Professor Basab Chaudhuri, Registrar and Acting Secretary, UCAC, University of Calcutta

Board of Editors

Editor: Dr. Mahua Chakrabarti, Associate Professor & Head of the Department of Museology, University of Calcutta

Professor Sachindranath Bhattacharya, Professor in Museology, University of Calcutta

Sri Supreo Chanda, Associate Professor in Museology, University of Calcutta

Dr. Indrani Bhattacharya, Associate Professor in Museology, University of Calcutta

Professor Dilip Kumar Ray, Visiting Teacher, Department of Museology, University of Calcutta

Professor Atul Chandra Bhowmick, Visiting Teacher, Department of Museology, University of Calcutta

Professor Chhanda Das, Visiting Teacher, Department of Museology, University of Calcutta

© University of Calcutta

PUBLISHED BY THE REGISTRAR, UNIVERSITY OF CALCUTTA
87/1, COLLEGE STREET, KOLKATA - 700 073

AND

PRINTED BY SRI PRADIP KUMAR GHOSH
SUPERINTENDENT, CALCUTTA UNIVERSITY PRESS
48, HAZRA ROAD, KOLKATA - 700 019.

Price : Rs. 150.00

Reg No. 2723B

G 165621

Need of the Hour

I feel great pleasure in presenting the Journal (Volume 10) of the Department of Museology, University of Calcutta.

The Department of Museology, University of Calcutta since its very inception in 1959 has been thick in activities in order to facilitate skill development, with an air to nurture creativity, innovation, employability and entrepreneurial spirit in young museologists as a part of capacity building measure. Dr. Manmohan Singh, Hon'ble Prime Minister of India, while inaugurating the bicentenary celebrations of the Indian Museum, Kolkata, on 2 February 2014, rightly pointed out that Museology in India is neglected. My humble opinion is nothing but mind block of the authorities. I am quite sure that the situation will change within a short time and the trained museologist after completion of M.A./M.Sc., Ph.D. will be placed in a suitable position and render their valuable services to make our museums much more research oriented as well as pro-people. I am happy to note that in our Department NET/ICHR/MoC/Rajiv Gandhi Fellows / University Scholars / non-NET scholars without any fellowship or scholarship doing Ph.D. work under the experts in various emerging thrust areas. The National Assessment and Accreditation Council (NAAC) has already acclaimed this Department as one of the rare and valuable departments of this five star University.

During the last two years, the academic performance of the Department is quite commendable. In last one year, the Department has organized two international seminars, one state level seminar and one Special Summer School for college and university teachers, with publication of proceedings.

The current volume of the journal explores different issues on Museology museum, and heritage. We received articles from a wide range of domain experts, from different parts of our country and abroad. We take this opportunity to thank all the learned contributors without whose creative support, it would have not been possible for us to bring out this volume of research journal in this present form. Besides, this journal was enhanced to be peer reviewed one with ISSN for the first time.

In this context, I would like to express my sincere gratitude to Prof. Suranjan Das, our Hon'ble Vice Chancellor, Prof. Dhrubajyoti Chattopadhyay, Pro Vice

Chancellor (Academic Affairs), Prof. Mamata Ray, Pro Vice Chancellor (Business and Finance Affairs) and Prof. Basab Chaudhuri, the Registrar.

I also express my sincere thanks to my colleagues and teachers who have keenly gone through all the articles.

I also express my gratitude to Sri Pradip Kumar Ghosh, Superintendent, Calcutta University Press; and his staff in bringing out this volume at the shortest possible time.

Dated: Kolkata, March 24, 2014

Mahua Chakrabarti
Head of the Department of Museology,
University of Calcutta

Contributors

AMRITA DEY

UGC Senior Research Fellow, Department of Museology, University of Calcutta

ANIRBAN BANERJEE

Technical Assistant, Gurusaday Museum, Joka, Kolkata

ARINDAM BANIK

Assistant Secretary, UCAC, Alipore Campus, University of Calcutta

BIPASA ROY CHOWDHURY (MAHAPATRA)

UGC non-NET Research Fellow, Department of Museology, University of Calcutta

DR. ANINDITA KUNDU SAHA

Former UGC Senior Research Fellow, Department of Museology, University of Calcutta, Kolkata

DR. ASHISH KUMAR SANA

Associate Professor in Commerce, University of Calcutta, Kolkata

DR. BAISAKHI MITRA

Assistant Professor & Head, Department of Museology, Rabindra Bharati University, Kolkata

DR. DHRITI RAY

Assistant Professor, Department of Museology, University of Calcutta

DR. GAURI SHANKAR MAHAPATRA

Assistant Professor in Museology, Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh

DR. MAHUA CHAKRABARTI

Associate Professor and Head of the Department of Museology, University of Calcutta

CONTRIBUTORS

DR. PRABIR LAHA

Guest Lecturer, Department of Museology, University of Calcutta, Kolkata

DR. SUDAKSHINA MUKHERJEE

Teacher, Department of Museology, Rabindra Bharati University, Kolkata

DR. SUDIPA RAY BANDYOPADHYAY

Associate Professor in Ancient Indian History and Culture, University of Calcutta, Kolkata

DR. TAPAN KUMAR DAS

Assistant Professor in Ancient Indian Art & Culture, University of Calcutta, Kolkata

ENAKSHI CHATTOPADHYAY

Former University Research Fellow, Department of Museology, University of Calcutta

ISHANI CHATTERJEE

Curator, Acharya Jagadish Chandra Bose Memorial Museum, Kolkata

JUTHIKA BISWAS

UGC Senior Research Fellow, Department of Museology, University of Calcutta

KEKAADHIKARI (BANERJEE)

Curator, the Asiatic Society, Kolkata

KRISHNA BHATTACHARYA

P.C. Mahalanobis Memorial Museum & Archives

MOUSRUTI DAS

University Research Scholar, University of Calcutta

MOUSUMI PURKAIT

UGC Rajib Gandhi Scholar, Department of Museology, University of Calcutta

CONTRIBUTORS

MRINALKANTI GAYEN

Assistant Professor, Government College of Art & Craft, Kolkata

NAFISA BEGUM

UGC Senior Research Fellow, Department of Museology, University of Calcutta

PIYASI BHARASA

Assistant Professor, Department of Museology, University of Calcutta

PRADIP KUMAR MONDAL

Deputy Curator, Rabindra Bhavana, Viswa Bharati University, Santiniketan

PROFESSOR ASOK KUMAR BHATTACHARYA

Former professor in Marine Science, Visiting Teacher, Department of Museology, University of Calcutta, Kolkata

PROFESSOR ATUL CHANDRA BHOWMICK

Former professor in Museology, Visiting Teacher, Department of Museology, University of Calcutta

PROFESSOR CHHANDA DAS

Former professor in Museology, Visiting Teacher, Department of Museology, University of Calcutta

PROFESSOR SACHINDRANATH BHATTACHARYA

Professor in Museology, University of Calcutta, Kolkata

PROFESSOR SUNJAY JAIN

Professor & Head, Department of Museology, Faculty of Fine Arts, the M.S. University of Baroda &

KANIKA B. MONDAL

Research Scholar, Department of Museology, Faculty of Fine Arts, the M.S. University of Baroda

CONTRIBUTORS

PROFESSOR SUPRIYA MUNSHI

Ex-professorial Fellow and Consultant, Gandhian Studies, Jaya Prakash Institute of Social Change, ex-Director, Gandhi Memorial Museum, Barrackpore, Kolkata; presenting visiting teacher, Department of Museology, University of Calcutta; also taught at the Asiatic Society, Vidyasagar University, Rabindra Bharati University, Open Universities, etc. Rotary International Award Winner.

PROFESSOR SYED ASIF AKHTAR NAQVI

Professor in Museology, Aligarh Muslim University, Aligarh

PUSPA DAS

UGC Senior Research Fellow, Department of Museology, University of Calcutta

RAMU KUMAR DAS

UGC non-NET Research Fellow, Department of Archaeology, University of Calcutta

SANGITA MUKHERJEE

UGC Senior Research Fellow, Department of Museology, University of Calcutta

SARBANI HALDER

UGC Junior Research Fellow, Department of Museology, University of Calcutta, Kolkata

SASWATI PAL CHOUDHURI

University Research Fellow, Department of Museology, University of Calcutta

SAYANI GHOSH

UGC Senior Research Fellow, Department of Museology, University of Calcutta

SHILPI ROY

UGC Senior Research Fellow, Department of Museology, University of Calcutta

SHREYASHI CHAUDHURI

Research Scholar, Department of Ancient Indian History and Culture, University of Calcutta, Kolkata

CONTRIBUTORS

SUHASHINI SINHA

Curator, Birmingham Museum & Art Gallery, London

SUMANA DUTTA

UGC Senior Research Fellow, Department of Museology, University of Calcutta, Kolkata

SUNANDA MONDAL

Former UGC Research Fellow, University of Calcutta, Kolkata

TANUSHREE CHAKRABORTY

Former UGC Senior Research Fellow, Department of Museology, University of Calcutta, Kolkata

Contents

MUSEOLOGY

Responsible Tourism: museums' participation as the driving force – an evaluative study in the state of West Bengal <i>Mahua Chakrabarti</i>	1
Role of conservational & preservation sciences in archaeology <i>Sachindranath Bhattacharya</i>	12
Social accountability of museum <i>Atul Chandra Bhowmick</i>	36
The case of fake relics <i>Supriya Munshi</i>	52
Preventing bio-deterioration of tangible heritage in museum collections <i>Syed Asif Akhtar Naqvi</i>	55
Demonstration: a time-proven technique of interpreting history <i>Sunjay Jain & Kanika B. Mondal</i>	59
To build up a museum management information system: a knowledge management approach <i>Arindam Banik</i>	65
Assistive technology for improving museum accessibility <i>Baisakhi Mitra</i>	72
Educational impact of museum on their visitors: the role of 21st century museums <i>Puspa Das</i>	80
Exploring visual communication in display – an integral part of science communication in science museums/centers <i>Sayani Ghosh</i>	86
Brain museum <i>Sangita Mukherjee</i>	90
Audience development: a significant function for museums at present <i>Enakshi Chattopadhyay</i>	95

The influence of museums in social change <i>Sudakshina Mukherjee</i>	100
Preservation of art objects on paper using aroma of natural plant products against biological organisms <i>Anindita Kundu Saha</i>	106
Effect of fungi as biodeteriogen on museum objects – a study of problems <i>Tanushree Chakraborty</i>	120
Theft: challenges for Indian museums <i>Gauri Shankar Mahapatra</i>	126
Sikshakshetre sangrahashalar bhumika (in Bengali) <i>Anirban Banerjee</i>	130

MUSEUMS

Future present: a study tour to the museums in the U.K. 23 January – 1 February 2011 <i>Piyasi Bharasa</i>	133
Indian Air Force Museum: Special Reference to Eastern Command Museum, Shillong <i>Dhriti Ray</i>	143
Birmingham Museum and Art Gallery – its history and collections <i>Suhashini Sinha</i>	147
The genesis of Rabindra Bhavana as a museum: Rathindranath Tagore's legacy <i>Saswati Pal Choudhuri</i>	153
Revisiting P.C. Mahalanobis Memorial Museum & Archives <i>Krishna Bhattacharya</i>	158
Earth Exploration Hall, Science City: a live test book of geography <i>Juthika Biswas</i>	162
A New Museological Paradigm – A brief concept of planetarium and the case study of M.P. Birla Planetarium, Kolkata <i>Moushruti Das</i>	166

Museum of Man – a unique representation of cohesive lifestyle of various Indian communities <i>Bipasa Roy Chowdhury (Mahapatra)</i>	175
Call for a standard documentation system in the museums of West Bengal with special reference to the Indian Museum, Kolkata <i>Shilpi Roy</i>	180
Plants in the service of man: a brief survey of the Indian Museum <i>Mousumi Purkait</i>	186
Lipika: Rabindranather pandulipi sanrakshan porikalpanar fasal (in Bengali) <i>Pradip Kumar Mondal</i>	189
The Coins and Currency Preserved in the Taka Museum of Bangladesh Bank : Their Ramification with Historical Perspective <i>Md. Amirul Islam</i>	195
HISTORY & HERITAGE	
Ganesha: the auspicious...the beginning, unraveling an enigma <i>Sumana Dutta</i>	203
Adi Ganga: the paleo channel of the Bhagirathi-Hooghly <i>Sarbani Halder</i>	210
Sridhara temple: a lesser known temple of Bishnupur: need for conservation <i>Ishani Chatterjee</i>	214
Urasgattas of Chhattisgarh: an ethno-archaeological and artistic overview <i>Keka Adhikari (Banerjee)</i>	219
Auspicious Symbols in Early Mediaeval Stone Slab Inscriptions of Karnataka <i>Sudipa Ray Bandyopadhyay</i>	234
The Naga in the Art of Bharhut <i>Shreyashi Chaudhuri</i>	238
Banglar prachin rajpath: itihaser prekshapatey, pratnatattver aloke (Khristiya prothom- unabingsha satak) (in Bengali) <i>Tapan Kumar Das</i>	249

Nouka: jibaney o Shilpey (in Bengali) <i>Mrinalkanti Gayen</i>	254
Manbhumer prachin itihās o sanskriti: pratnatattver aloke (in Bengali) <i>Ramu Kumar Das</i>	263
On necessity for conservation of natural history museums: a geological study from different sites of India <i>Asok Kumar Bhattacharya</i>	265
Silkworm resource and biotechnology in India <i>Chhanda Das</i>	274
Animal diversity and Indian philately <i>Sunanda Mondal</i>	279
Museums' preservation of insects: An important component of our natural heritage <i>Nafisa Begum</i>	284
Medicinal plants used by traditional healers in Chotanagpur Plateau, India: a Museological study <i>Amrita Dey</i>	290
Business History of India: A Study with Reference to Family Business <i>Ashish Kumar Sana</i>	297
Satabarsher aloke Sir Asutosh (in Bengali) <i>Prabir Laha</i>	310

Museology

Responsible tourism: museums' participation as the driving force – an evaluative study in the state of West Bengal

MAHUA CHAKRABARTI

Introduction

Travelling has always been a part of human nature, whether for religious purposes, education, business or other motivations. Certain inventions, like currency and early roads mark the beginning of the modern era of travel.

Today, in any country, tourism development can be defined as the process of providing facilities and services for visitors to a destination to gain economic and other benefits. Responsible tourism is a work in originating markets and destinations around the world, to make 'better places for people to live in and for people to visit'. In other words, responsible tourism can be defined as the science, art and business of attracting visitors, transporting them, accommodating them and graciously catering to their need and wants.

The characteristics of Responsible Tourism are as follows¹.

- It minimizes negative economic, environmental, and social impacts;
- It generates greater economic benefits for local people and enhances the well-being of host communities, improves working conditions and access to the industry;
- It involves local people in decisions that affect their lives and life chances;
- It makes positive contributions to the conservation of natural and cultural heritage, to the maintenance of the world's diversity;
- It provides more enjoyable experiences for tourists through more meaningful connections with local people, and a greater understanding of local cultural, social and environmental issues;
- It provides access for physically challenged people;
- It is culturally sensitive, engenders respect between tourists and hosts, and builds local pride and confidence; and
- It is integrated in the local ecosystem."

¹ Wikipedia

A term 'sustainable tourism' is nowadays also in wide use. Responsible tourism and sustainable tourism both have identical goal, that of sustainable development. Thus, the objectives of responsible tourism are the same as those of sustainable tourism – i.e. environmental integrity, social justice and maximizing local economic benefit. However, there is a major difference between the two. In responsible tourism, individuals, organizations and businesses are asked to take responsibility for their actions and the impacts of their actions. The emphasis on responsibility in responsible tourism means that everyone involved in tourism – government, product owners and operators, transport operators, community services, NGO's and CBO's, tourists, local communities, industry associations – are responsible for achieving the goals of responsible tourism.

Tourism is not only a business but also a social or a cultural institution. In general, tourism can further "the understanding and appreciation that builds a better world for all. International travel also involves the exchange of knowledge and ideas [...] raise levels of human experience, recognition, and achievements in many areas of learning, research, and artistic activity"². For the tourist, the highest purpose of the travelling is to become acquainted with people in other places and cultures. This is especially the case with cultural tourism, where people are learning about each other's history and ways of life, to gain deeper knowledge on the society one visits – and even for further self-recognition and understanding. For the host society, cultural tourism is also important because it broadens the local cultural horizon and it is important for promoting cultural relations and international cooperation. Therefore, tourism is often taken into the account when it comes to developing regions cultural policies, where it is used to promote certain image of the place. However, this development does not only serve the goals of tourism, since it is both important for strengthening the regions existing infrastructure, it can reinforce preservation of heritage and traditions and strengthen the local self-identity.

Responsible Tourism throughout the world

As the best way to increase the positive influences of tourism and reduce the negative ones, Responsible Tourism is fast becoming a global trend and it is gaining wide acceptance across the world today. Operators, destinations and industry organizations in South Africa, the United Kingdom, United States, the Gambia, India, Sri Lanka, are already practicing Responsible Tourism, and this list is growing. Recognizing the global significance of Responsible Tourism World Travel Market, one of the world's largest travel exhibitions, has created World Responsible Tourism Day, to be celebrated annually during November. World Responsible Tourism Day is endorsed by the World Tourism Organization and World Travel and Tourism Council.

² McKercher, Bob and Hilary du Cros: Cultural Tourism. Page xi.

Across the world, tourism has today become a vanguard of change, transforming countries and states into buoyant economies. Responsible Tourism has gathered momentum over the last decade in the UK, and there are communities of responsible tourism practitioners in business, government, NGOs, conservation and heritage. Those communities' work focuses on the principles of the Cape Town Declaration on Responsible Tourism in Destinations, those work in originating markets and destinations around the world, to harness tourism to make "better places for people to live in and for people to visit." Those work with governments, tour operators and accommodation providers to realize the aspirations of the Responsible Tourism Movement.

Pioneering the concept of responsible tourism in India is Kerala. Kerala has emerged as one of the prime tourism destinations on the national and international map. This holistic form of tourism is helping travelers, the host population and the trade derives the greatest possible benefits from tourism, without causing any ecological or social damage. The concept of responsible tourism show successful developments in social, environmental and economical sphere of tourism in Kerala. Responsible tourism is providing better living conditions for the local community. Kumarakom (in Kerala) becomes a model for economic responsibility activities with the strong support from the 'Kudumbasree Groups', Local Self Government, Farmers and Industry partners. The organized work enhance and rejuvenate the local production of the region in terms of agriculture produces, fish, chicken, egg and other non-perishable items like flours, processed food, local snacks, etc. Cultural wing and Handicrafts units started under the responsible tourism initiative contribute a major portion in the economic line.

Following the success of Kumarakom, responsible tourism is today being implemented in other tourist destinations across the State. The other three spots, Wayanad, Kovalam and Thekkady emerged as strong destinations of responsible tourism.

Responsible Tourism in West Bengal

The state of West Bengal is unique in terms of tourism; it is the only state in India, which has all the three vital ingredients – sea (Bay of Bengal), mountains (Eastern Himalayas) and forest (Sunderbans).

Although tourism statistics show that a large amount of revenue is brought into the state, factors like the rate of outflow of tourism receipts and to what extent the local economy retains the revenues generated by tourism is still not clear. There are several challenges that the industry faces like degradation of environment, degeneration of cultural heritage and social inequalities. Recognizing these adverse impacts and the priority expressed in the Cape Town Declaration call for action "to create better places for people to live in and for people to visit."

As far as tourism in West Bengal is concerned, it is still backward as compared to the other Indian states. In spite of having places of tourist attraction like the hill stations of Darjeeling and Kalimpong, tea gardens of Dooars in North Bengal, the coastal town of Digha, the nature's retreat Santiniketan, historical places like Murshidabad, Malda, Plassey, Nabadweep, Vishnupur, etc. and Kolkata itself, responsible tourism has not developed properly.

Tourism and Museum

Tourism and museum, each sector has a different disciplinary focus and mandate, serves a different role in society, has different political overlords, and is accountable to different stakeholders groups. All this can make the relationship difficult, which might result in many lost opportunities in providing "quality visitor experiences while managing rare and fragile resources in a socially, environmentally, and ethically responsible and sustainable manner"³.

For tourism and its development, the responsible use of the resources or the assets has been recognized as a major topic in recent decades and that discussion does address the use of the cultural heritage as a resource.

Tourism and museum both are dependent upon the social, cultural and natural environment within which those occur, and their success is dependent upon the environment that those operate within it. Good relationships with neighbors and with the historically disadvantaged make good business sense. These relationships need to be based on trust, empowerment, cooperation and partnerships. Too few of the benefits from tourism currently accrue to local communities whose environment is visited.

Involving local communities in tourism, creating employment and training and awareness programme could be identified as solutions to the problem of security for tourists. There is much still to be done and this is a core challenge for responsible tourism.

The potential of the state of West Bengal in developing Responsible Tourism

West Bengal is becoming more and more popular as tourist spot. Cultural tourism and tourism related to conferences and business have been growing. The tourist season is becoming longer. The museums of West Bengal have great tourism potential and it does not have to change much to become more "tourist-oriented". There are opportunities regarding the development of marketing and public relation strategies.

- The museum might be considered a place of discovery.
- Interest in history could be increased, and there are many interesting perspectives to look at the history of the tourist spots of West Bengal.

³McKercher, Bob and Hilary du Cros: Cultural Tourism. Page xi.

- Museums and co International and domestic contacts can support with more exhibitions. There is a great willingness in cooperation among different organizations to strengthen tourism in the state.
- The open-air museum gives it unique opportunity to attract tourists.
- The museums have the opportunity to focus on special type of tourism, incentives which are becoming more popular today.
- The museum can also focus on families, tourists with children.

Though there is much opportunity for developing responsible tourism in West Bengal, there are some weaknesses, such as:

- ▶ In West Bengal, there is lack of determination towards focusing on tourists and audience development. The museum's policy does not encompass the development of tourism outside the cities.
- ▶ There seems to be a lack of awareness of the museums existence among tourists and the museums of West Bengal seem to have a low profile.
- ▶ There are lack of knowledge within the museum on its visitors, including tourists; their needs and wishes.
- ▶ There is also lack of focus on the museum's marketing and public relations strategies.
- ▶ The exhibitions in rural museums are not designed with tourists in mind. Texts are mainly in Bengali, which results in that tourist might not find the museum is for them.
- ▶ There are no "thrilling" activities available (lack of "blockbusters").
- ▶ There are few "highlights" in the display of collections (with some exceptions like the Egyptian Mummy in the Indian Museum, Kolkata or throne of Queen Victoria in the Victoria Memorial Hall, Kolkata).
- ▶ Buildings of some museums are so big and can be confusing – lack of easy "flow" and a "red thread" in the exhibitions (E.g. Indian Museum, Kolkata, or Victoria Memorial Hall, Kolkata).
- ▶ There is lack of practical information for users on the Internet, the museum's web site.
- ▶ There is not much activity for tourists at the museum during the peak season, when the operation towards visitors is run on low profile, most of the buildings, houses are closed, and there are few guided tours.
- ▶ It does not seem attractive to visit an open-air museum (like National Parks or sanctuaries) in West Bengal in bad weather.
- ▶ The location of museums in suburbs can cause difficulties in visiting it and the public transport to the museum is not good.
- ▶ The archaeological museums do not have high level of physical visitor potential, since the houses those consist of are valuable and fragile museum objects, themselves and it can be difficult to protect or preserve all object on display.

- ▶ Many of the museum buildings make access difficult, i.e. for large groups and for handicapped people.
- ▶ Tourism organizers promote mainly the museums of city areas and therefore some of the tourists come only to see it and nothing else.

The potential of museums as responsible tourism development tool

- ▶ Museum is an important source of knowledge and can be seen as a key to understand the history of the city. Thus, a museum with a clear concept can make the museum an obvious tourist attraction so that revenue earning could be easy.
- ▶ Often the building itself, is outstanding and very attractive to visitors and some of the exhibitions may be recognized as tourist attractions. Nominal charges for photography may help revenue earning of the museum.
- ▶ The museum's location in the centre of the tourist spot makes it very easy to find and quite accessible. It may also be close to public transportation.
- ▶ Most of the objects on display in the exhibitions could be presented in a manner that can be identified as accessible for visitors, though protected against damages.
- ▶ The museum may have a long history and tradition (especially linked to the building). It may be recognized, as an important centre of data.
- ▶ There should be a traditional awareness and determination, both inside the museum as well as outside, regarding the museum's role towards tourism.
- ▶ The museum and the staff should have much experience on serving tourists.
- ▶ There should be possible guided tours around the museum area and during the summer, there may be much activity, which can make the museum a living museum.
- ▶ An open-air museum (like Sanctuary, Zoo, National Parks, etc. which are now considered museums according to the definition of ICOM) can organize several different thematic exhibitions and it may be treated as a recreation area – “a country side” within the city's borders.
- ▶ The museum stores and the cafeteria must be quite good and charming.
- ▶ Good texts and signs in regional language, national language and English create good impact on visitors' mind.
- ▶ The museum's guidebooks and the guides working at the museums fluent speaking in several languages may attract visitors.
- ▶ The city's cultural institutions (galleries, libraries and archive) are to be in a quite close cooperation. They can form a strong unit i.e. regarding marketing and international relationship.

Partnerships

The government's tourism policy should be planned in a manner that it becomes a unifying force, one that imparts direction and opportunity to the youths. If properly

implemented, Tourism can play the role of a non-invasive instrument of revitalization, conservation and growth. The slogan would be "Balanced Tourism Development" that will ensure the type and scale of tourism development, which is friendly with the environment and socio-cultural environment of the state.

To achieve the desired objectives, the structural organization of the tourism set-up has to be further strengthened. Processes and procedures has to be simplified along with the strengthening of the statistical machinery, reporting systems and development of a comprehensive data base to measure and evaluate the socio-economic benefits derived from Tourism.

Tourism Development can be defined as the process of providing facilities and services for visitors to an end to gain economic and other benefits.

- **Economic objects**

The economic objectives of tourism development include direct employment in hotels, airports, airlines, tour operators, travel agents, and tourist offices and indirect employment in industries that serve the travel and tourism industry.

- **Environmental Objectives**

Environmental education and information help the tourist understand the reasons for conservation and encourage them to value the environment and to preserve heritage sites.

- **Socio-cultural objectives**

The socio-cultural objectives promote cultural understanding, enhancing the image of an area and creating a national identity.

Futuristic Tourism Development Avenues

Nobel Laureate Amartya Sen, on many occasions, has highlighted the immense economic viability of launching Eco-Tourism/Sustainable Tourism or more appropriately "Responsible Tourism" in his home state of West Bengal, which according to him, has the potential to ameliorate the sagging rural economy of not just West Bengal but other states of India as well.

Let us consider a set of "Futuristic Tourism Development Avenues", which if implemented properly, promises to steer in a second Bengali renaissance, which is "Renaissance through Tourism" in Tagore's land.

We can propose a List of Futuristic Tourism Development Avenues for West Bengal's Tourism Industry, which can be materialized with the help of museums.

1. Agro Tourism

West Bengal is primarily an agriculture driven state and almost 70% of people depend upon agriculture for earning their livelihood.

These days, tourists demand real experiences during his /her holidays. The demand is for pleasant surroundings, usually at reasonable rates, which West Bengal does have in abundance.

The essential ingredient of this new kind of tourism package is the organization of recreation, which alone can enrich the tourism experience by allowing greater integration with the place visited and fuller involvement in the social and cultural life of the rural destination.

It can be called Agro Tourism or Village Tourism and under this project, a village in the radius of 30-40 kilometers of upcoming cities and bustling metros are taken under the project. With the mutual understanding of the village Panchayat, the resident villagers and local museums, the entire village can be developed for the project.

A common place in the village is selected, particularly the land, which is for common use. This place will provide a podium for artisans, snake charmers and other rural artists who solely depend on road shows for their livelihood. Other places in the village like the cultivated pond, vegetable and fruit gardens etc. are impeccably preserved for the visiting tourists. The city populace who has not seen the real village life would get a glimpse of the village life.

2. Fishing and angling tours

The Bengalee and his fish are inseparable. In every district of West Bengal, there are many rivulets, ponds and streams where varieties of fishes are reared. Moreover, West Bengal has the highest numbers of country made boats. Historically, the boatmen of Bengal are a unique lot. Their slow, uncluttered and philosophical outlook on life has been the subject of rich Bengali folklore.

The government first needs to identify a bunch of fishing villages for accelerated tourism development. The pivotal idea is to construct rural fishermen's huts made alongside the water bodies so as to provide shelter to the tourists. Their unique folk songs and traditions can be displayed in the central display place of the fishing village. For the fishing and angling enthusiasts, relaxed boat rides on the water bodies may be encouraged and permission may be granted for fishing in the waters. Fishing equipments may be rented out to the tourists as well to increase the experience.

3. Introducing Horse Cart Rides

These days, horse driven carriages are uniqueness. Being the center of British India, horse driven carriages were introduced by the British East India Company in Kolkata and many other parts of West Bengal.

Although introducing horse carriages may not be possible in cities, it can be favorably started in rural Bengal. The prospect of riding through charming countryside can be a thrilling feeling for the tourist.

Exclusive Horse Riding Retreats may be introduced in places with a colonial past like for instance Kalyani, Murshidabad, Plassey, Krishnagar, Bandel etc., which were connected with the British Raj as well as the Mughals. The introduction of

exclusive horse riding retreats in the above-mentioned places' would not only lead in an innovative tourism experience, it would also be a wonderful way of reviving the past glory of Bengal.

The Department of Tourism, Government of West Bengal along with the local Municipal bodies may first identify the sites suitable for rural horse riding retreats and then come up with a comprehensive tourism development plan. Local museums can help in this matter.

4. Tree House Tourism

Tree house recreation has of late made its mark as a much sought after alternative form of recreation. This concept has become hugely popular in the state of Kerala and some parts of Rajasthan. In places like Vythiri, Mudumala, Munnar as well as in the district of Idukki, tree houses are of high demand, which can be followed in West Bengal.

The ideal location for introducing tree house tourism would be the Dooars region of North Bengal, the Mahananda-Jaldapara-Gorumara-Buxa Wildlife circuit will definitely provide the tourists with not only jungle scene but also wildlife encounters with the creatures of the wild.

Other places worthy of tree house recreation are the tribal areas surrounding Jhargram hills in Paschim Medinipur district where the Subarnarekha River and the profusion of forests can provide the ideal backdrop to the tree houses.

There is also Bethuadhari Reserve Forest in the district of Nadia, which is a place with the birds and a few species of fauna like spotted deers, pythons, monitor lizards and turtles. The Bethuadari Forest Reserve has always been an enigma for many weekender tourists.

5. Colonial Tourism in Kalyani

The modern beautiful eco-friendly township of Kalyani was developed to relieve the population from Kolkata and Kalyani was once an American Base - Roosevelt Town, named after the late President of USA.

The government of West Bengal would do well to declare Kalyani as a colonial tourist destination. The Indo-US joint military initiatives are at an all time high, both the Indian army and its counterparts in USA would do well to cooperate in shaping up Kalyani as a much-preferred colonial tourist destination.

The large museums situated in cities can organize such tours in collaboration with the Government of West Bengal.

6. Declare the District of Nadia as a spiritual tourist destination

The district of Nadia has a great spiritual heritage and tradition, which is still alive. Nabadweep Dham, a small town of Nadia district happens to be the birthplace of Sri Chaitanya who is regarded as the *avatara* of Lord Krishna in this age whose mission it was to teach love of god through chanting his holy name. Also in the

district of Nadia is Mayapur where the headquarters of the world famous International Society of Krishna Consciousness (ISKCON) is located. The 'Hare-Krishna' movement becomes popular in the modern era. ISKCON in particular has mega tourism plans for Mayapur and Nabadweep Dhâm and the government can effectively play the role of a catalyst. The Sri Prabhupada Museum at Nabadweep is devoted to this 'Hare Krishna' movement.

7. An integrated pilgrim tourism circuit in the abode of Sri Ramakrishna Paramahansa

The Ramakrishna Mission is renowned the world over as a spiritual and philanthropic organization that dates back to 1897 and was started by Swami Vivekananda. Belur Math, the headquarters of the Ramakrishna Mission is an international pilgrimage place along with the villages of Kamarpukur and Joyrambati. While Kamarpukur is the birthplace of Sri Ramakrishna Paramahansa, the nearby village of Joyrambati is the birthplace of Holy Mother Sri Sarada Devi who was the spiritual consort of Sri Ramakrishna.

The government of West Bengal would do well to enter into a contract with Belur Math to facilitate "Volunteer Tourism", which has now made its presence felt in the fast changing global tourism industry. Thousands of devotees every year come to visit the Belur Math as well as the ancestral villages of Kamarpukur and Joyrambati. Most of them are attracted by the Ramakrishna Mission's philosophy of "doing well to the world with a spirit of worship and thereby paving the path for one's own salvation".

9. Bengali fairs and festivals

West Bengal is a land of festivals and fairs. Throughout the year, different fairs and festivals like the Gangasagar Mela, Poush Mela of Santineketan or the 300 years old Sati Ma's Mela at Kalyani, are regularly held. The Fairs and festivals of Bengal are unique and to be found nowhere else on earth. Most of them are traditional age-old festivals that have been celebrated by generations of Bengalis and yet they continue to appeal the outside world.

Given the plethora of fairs in West Bengal, the government needs to identify a few such fairs wherein the element of ethnicity and heritage is most profound and then go in for accelerated infrastructure developments.

There is a dearth of quality tourist accommodation in places of West Bengal where fairs are held. Most do not even have the basics like comfortable rooms, clean linens and toilets. The need of the hour is to improve the infrastructure facilities in the form of tented accommodation, sanitary provisions and good hygienic food. In addition, proper signage have is to be put in place for the benefit of the tourists from abroad. Fairs and festivals serve as great public relation tools for any tourist destination and helps in depicting the state's cultural landscape in a rather profound

manner. Not only this, fairs and festivals also leave an indelible mark on the people's mind since everything is presented live in front of an audience, the impressions of which they carry with them to their respective countries and disseminate amongst their friends and relatives. Museums located nearby the areas of the melas and festivals can make accommodation and conducted tour for the tourists.

10. Son et Lumiere on the Bengal Renaissance

The renaissance period after the infamous 1857 rebellion against the British rule saw a spontaneous outburst of Bengali art and literature. It was during this period that the great spiritual giant Sri Ramakrishna made his appearance and it was left to Swami Vivekananda – the cyclonic monk of Bengal to spread the tentacles of Vedanta to the world community. This period also saw the emergence of great souls like Nobel Laureate Rabindranath Tagore, Rishi Aurobindo and others of their ilk.

It is high time the government comes up with a high-tech “Son et lumiere” on the great Bengal Renaissance, which are and may be showed in museums like Rabindra Bharati Museum, Victoria Memorial Hall, ancestral house of Swami Vivekananda, Deshbandhu Museum, ancestral house of Rishi Bankim Chandra Chattopadhyay, Viswa Bharati, and so on for the entertainment of the discerning international travelers. There are still many facts that the rest of the world does not know about the Bengal Renaissance, which may be unraveled in the true spirit of the renaissance to the new age traveler to Bengal.

Conclusion

It is true that there are problems in abundance when it comes to developing the Tourism industry in a state like West Bengal. What is inspiring though is that there seems to be awareness in the minds of the people as well as of the government of West Bengal that everyone has to unite. With the power of grass root institutions, the deteriorating tourism standards can be arrested and improved upon. Apart from the government, NGOs and International organizations also have to share the responsibility and help and guide the local citizenry in developing a sound and sustainable tourism platform for West Bengal.

The future relationship between tourism and museum is going to be the key issue for West Bengal's tourism industry as it will be for the rest of India and the world. Being sensitive towards environment in our pursuit of pleasure in the hills, beaches, grassland and fragile areas would be the wise thing to do.

Reference

Retrieved from

http://en.wikipedia.org/w/index.php?title=Responsible_Tourism&oldid=546893358

<http://www.wbfdc.com/>

Role of Conservational & Preservation Sciences in Archaeology

SACHINDRA NATH BHATTACHARYA

To address the above issue we must know exactly what do you mean by the term Preservation, Conservation, Restoration.

- (i) Preservation means : The act of preserving or keeping in safety or security from harm, injury, decay or destruction.
- (ii) Conservation indicates : The act of preserving, guarding or protecting; preservation from loss, decay, injury or violation.
- (iii) Restoration means : restoring or being restored, reinstatement, a putting or bringing back into a former, normal or unimpaired state or condition.

Archaeology as we know is the study of human activity in the past, primarily through recovery and analyses of the material culture and environmental data.

We would like to discuss some important areas of conservation and preservation sciences specially to preserve, conserve and also to restore the archaeological materials which include stone, terracotta, wood, coins, beads etc.

How archaeological objects could be properly conserved or preserved or restored with application of modern science and technology that is the main issue to day. I must mention here that there are some criteria which are laid down by ICOM and there are some legislations which are enacted by the Govt. of India with regard to above issues.

The role of conservation sciences is an attempt to prolong the life of the object and their historical, artistic and aesthetic value. In the museum community, conservation is the technology of preserving collections and with the help of science the basic objective of all museum conservation should be to preserve the objects in a stable condition. It should not be the attempt of the museum personnel to alter or to reconstruct an object. In case of archaeological objects we say "prevention is better than cure".

To conserve and preserve archaeological materials we are to consider the following aspects for proper application of scientific method :

1.
 - Environmental agents.
 - Relative humidity.
 - Temperature.
 - Light.
 - Air pollution.

2. Human factors:
 - war.
 - Fire.
 - Theft.
 - Vandalism.
 - Careless handling.
 - Improper use.
 - Neglect.
3. Biological agents
 - Insects.
 - Macro and Micro-organisms, and
 - Pests.
4. Natural disaster
 - Floods
 - Storms
 - Earthquakes
 - Volcanic eruptions etc.

The scientific role played by the museums are required to follow the following basic factors :

Level 1

Evaluation of the condition of the objects during the time of collection. After evaluation, objects are to be photographed before taking any step for conservation and during this period museum environment, temperature and humidity must be controlled with the help of high technology. Besides, the objects should be adequately housed, handled and objects should be done with extreme care, lux factor to be consider, considering the nature and character of objects. In level one objects, if damaged should be prevented to control and monitor to check further deterioration.

The following protocol should be followed :

- (a) Establish proper and complete records for all collected objects.
- (b) Inpect collection of objects on a regular basis.
- (c) Trained collection care and exhibits personnel to identify the symptoms of deterioration.
- (d) Employ scientific way in handling, storing, exhibiting and transporting objects.
- (e) Monitor and regulate the museum environment.
- (f) Provide adequate safety and security and fire protection of objects.

Collection Care

We can now address three primary scientific ways for collection care :

- (i) Proper scientific facility that includes consistency in temperature and RH levels.
- (ii) In house training for all persons coming in contact with museum collections for proper scientific care of archaeological objects.
- (iii) There can be no excuse for proper house keeping.

Level 2

The second level of conservation is preventive. The goal at this level is to prevent, control, retard deterioration or damage. At this level objects with some minor problem should be isolated in a dust free micro-climate. It is imperative that any preventive care or treatment that impacts directly on collection items be carefully considered prior to initiation of any step. No protocol for treatment should be considered without consulting a qualified museologist or conservationist.

To provide safe and secure storage for museum collection the assigned space must be indicated. The well known proportion 40-40-20 means total space in the museum, 40% for space for collected objects 40% for exhibits and 20% for all other facilities i.e. office, auditorium, library, discovery room etc.

For archaeological materials 300 lux may be considered useful, ultraviolet radiation to be controlled by installing proper ultra filtering materials.

Level 3

We consider this formula i.e. Object + Care + Use = Worth of Museum.

This level includes actual restoration to return a damaged object to its original form we know deterioration in any form is inevitable. All things deteriorate and it would be the responsibility of museum personnel to determine the nature and cause of deterioration with proper recording of information so that we could compare the condition of object after restoration.

Level 4

This level is to further scientific knowledge and professional practice in the field of conservation, preservation and restoration. The goals are to strengthen conservation resources and to develop hi-tech methods that will give no long term benefit to conserve cultural property.

Management of environment factors

In a Museum if there is a provision of Heating, Ventilating, Air conditioning system (HVAC) then it would be easy to control temperature and humidity. There are number of reasons for humidity and temperature control. From collection care the main reasons in *moisture* stability in materials.

We know some archaeological collections are hydrophilic and if we fail to control proper humidity level then there will be number of conservation and preservation problems.

Light is another critical environmental factors. Natural light is the most harmful form of energy for museum collections. It contains all frequencies of electromagnetic energy including heat and ultraviolet light. Now there are lot of artificial lighting systems available which could be used for illuminations.

Recommended light level

- Objects insensitive to light — no limits except heat
 - Objects moderately sensitive to light — 150 lux
 - Objects very sensitive to light — 50 lux
- (1) To monitor temperature and relative humidity we use Thermohygrometer.
 - (2) For recording relative humidity and temperature we use Recording hygrothermograph and also digital Thermohygrometer.
 - (3) To measure the intensity of light we use Digital light meter.

Now I want to mention conservation and preservation protocol for preservation of *wooden objects*.

Wood has been exploited by man since paleolithic times. Man has done almost every thing with wood, build up home, for fire, utensils, weapons, built watercraft, hunting weapon, ships, bridges, chariots, vehicles, furniture, art objects, musical instruments etc and in modern times transformed into paper and textile. Being organic in origin it decays under combined biological and chemical attack specially when buried in the underground, but in the extraordinary circumstances it has been found surviving prolonged exposure to extreme dryness or wetness. Wooden archaeological material that has been buried in extremely water logged condition for a long period may retain its shape and size. The absence of air, inhibits fungal attack. But profound changes could take place in micro-structure and chemical composition resulting the loss of physical strength. Such specimens are to be removed with suitable support from the original site and to be dried in controlled temperature or with the help of ascending graded of alcohol i.e. 20% 30% 40% 50% 60% 70% 80% and 90% to remove excess H₂O.

In sharp contrast, wood completely decayed when buried in wet sand is well acrated and due to fungal attack it is decayed. I can cite one very interesting example here the excavation of the 7th century ship burial at Sutton Hoo yeilded many notable treasures now kept in British Museum although the ship had succumbed learning only rusty iron nails and a *stained impression* in the sand to mark where wooden planks had rested. We confront various problems while dealing with the wooden materials. To preserve wooden objects it is very important to familiar characteristics of raw materials. Wood is an *anisotropic* substance exhibits different degrees of

toughness and hardness in different directions. It has an organised cellular structure and the fibres are oriented in the same direction. In a longitudinal plank there are two zones heart-wood and sap-wood.

Some basic steps for conservation and preservation of wooden materials

- (a) Cleaning of surface dirt, dust, mud, if any with the help of soft hair brush dirt and dust could be removed.
- (b) To remove mud it is soften first with the help of water then with help of brush mud could be removed.
- (c) After cleaning, if there is no sign and symptoms of any attack of micro-organisms then we can use either dilute creosote solution or shellac solution to protect the object from further deteriorations.

The composition of creosote and shellac depend on the colour and condition of the objects :

Normally

2 to 5 cc crude creosole with the addition of 100 cc Kerosene can be used.

Alternatively

2–5 gms white shellac dissolved in 100 cc mettrylated spirit with addition of 25 gm merenric chloride can be used for preservation of wooden objects.

Removal insect and fungi

If any wooden object is highly infested, by using 2% carbon tetrachloride or 1% methyl bromide or 1% ethylen dibromide infestations could be controlled.

If we see the infestation of fungi, 1.5% to 2% mercuric chloride or 15 to 25%. Pentachlorophenol dissolve in alcohol may be used. Besides there are number of fumigants which can be used for removal of insects and fungi i.e. thymol, formaldehyde, carbon-di-sulphide.

Consolidation of wooden objects

In the case of frail and fragile objects to consolidate the objects we can use 2% PVA or Polymethyl methacrylate.

Repair of broken wooden objects

Polyvinyl Acetate, Feriocol may be used for repairing broken objects.

Sterilization of wooden objects

Infected wooden objects can be treated with hydrogen cyanide or ethyl bromide, carbon-di-sulphide for sterilization.

Besides by using liquid gamarine pentachlorophenol, chloronapthalene wooden objects may be sterilized.

In case of water logged wood the protocol for preservation of objects may be in the following manner. We know that water logged wooden specimen become

fragile due to the loss of *ligno cellulose*, although cellulose more or less remained unchanged and the objects become spongy. With the help of proper support it has to be removed from the water body then in a controlled temperature very slowly H₂O will have to be removed from the object and then to be wrapped with sterilized cotton cloth.

To consolidate the specimen it can be immersed in alum bath

10% Alum in 100 cc of water along with small amount of glycerine to be kept there atleast for 12 – 24 hours.

Or

Alcohol ether resin bath

There must be number of alcohol ether resin baths having 20% 30% 40% 60% 70% 80% 90% then it has been removed the quantity of ether and resin depend on the degree of sponginess of the object.

The author wants to provide a list of chemicals as well as their characters and uses in preservation conservation and works of Art and Antiquities.

Alkali

Alkali is a term applied to the soluble hydrochloride of the group of metals consist of sodium, potassium lithium, rubidium, casesium etc. Sodium chloride available in nature ie., Common salt, Caustic soda, Sodium hydroxide a strong alkali requires careful use and handling; widely used in conservation work.

Alkanet

A plant cultivated in southern Europe; produces red dyes or stain from the root; widely used in wood finishes.

Amber

Resin of fossils of golden hue, more rarely with bluish tints; hard but softens when immersed in a hot oil bath; dissolves in alcohol and acetone; widely used as varnish; removed by washing with soap and water; joined with the help of celluloid cement artificial amber can be made from copalresin, camphor and turpentine; dissolved by ether.

Amboyne Wood

Imported wood used for verneers and inlays most used during the later part of the eighteenth century.

Ammonia

Gaseous compound of nitrogen, hydrogen; soluble in water; liquid form, acts as water softner and grease dissolves any soluble grease; effective cleaning agent;

removes dirt, soot and grease; effectively removes all kinds of tarnish on silver; it attacks metal; dilute solution used as cleanser for porcelain and glass leaving the surface dirt, soot, and grease free and sparkling; employed in stone work of art to remove micro organisms and lichen and mosses; concentrated solution of ammonia used to remove varnish from art objects.

Amyl Acetate (Banana Oil)

Clear liquid; strong and pungent odour of pear drops; dissolves celluloid rapidly and acts as base of the popular cellulose paints; difficult to remove them rapidly; acetone also used for the same purpose; cellulose paints widely used for restoration of broken porcelain; overflow and overpainting of cellulose paints removed either with amyl acetate or acetone. Another cementing material can be made by dissolving celluloid in a mixture of amyl acetate and acetone. Durofix or Duco available in the market can also be used for this purpose.

Annealing

Relieve stresses and strains metals are annealed to restore shape and size; operates by creating a condition under which the molecules can recover from the effects of distortion i.e., cold bending etc.,.

Bloom on Varnish

Cloudy appearance seen on the surface of the oil paintings; blooming on varnish resulted may be due to the presence of moisture on the surface of the paint layer or varnish restored with the application of warm oil of turpentine; after softening using a brush followed by drying in warm sunshine; use of light machine oil also used; small amount of machine oil is applied on varnish with clear soft cloth and rubbed over the surface until and unless it is absorbed specially when the varnish is damaged.

Bone

The hard tissue i.e., constitute the skeletal frame work of the animal; composed of about 70% of mineral salts, and of this 60% is calcium phosphate and remaining 30% is organic matter, impregnation of paraffin wax necessary for strengthening and consolidation of bone objects.

Borax

Sodium Pyroborate, greyish or translucent white crystals; used as flux in soldering and as component of glass making; also in taxidermy work.

Boule -Work

Associated with the work of Andre Charles Boule made Premier benish de la Maison Royale in 1673 perfected a type of decorations for furniture; an inlay of tortoiseshell and brass which ebony and silver was mixed together; ornamented furniture with finely chased ormolu casting use of fine abrasives is recommended for cleaning

polished or lacquered if necessary.

Brass

An alloy of copper and zinc although mixture of copper and zinc are reference of brass in old testament probably errors in translations; first evidence in Roman times Orichaleum means brass' an effective cleaning agent is oxalic acid and salt although Vinegar and salt is also recommended; wash the brass in 15% ammonia solution to remove surface dirt; clean with dilute oxalic acid and salt mixture; wash in distilled water'; apply sweet oil on the surface.

Breccia

Stone composed of angular fragments of rock cemented altogether with contrast colour; there are varieties of breccia; used widely for ornamental purpose in Egyptian vases.

Bronze An alloy of copper in tin; colour varies from dark brown to light golden colour; Bronze was used for making sculptures, tools, weapons, ornaments, ceremonial vases domestic ware and votive offerings; the mixture of copper and tin vary; in most of the cases bronze contains 75% copper, 3% tin, 20% zinc and 2% lead; corrodes easily specially in moist air; a light green surface deposit is formed known as air patination; buried bronze for a long periods show greater degree of corrosion even metal could crumble if it is not handled properly corroded and most of the time seen in green or blue due to the formation of copper carbonates; red and black from copper oxides; and in Egyptian bronzes slightly unusual green appearance-copperoxy-chloride. Corrosion is also called patination; in case of even patination all over the object is noble patination; it protects object; should not be removed; although protect the metal surface; uneven, highly corroded injuries to object called malignant patinations. Chinese bronze of the chou dynasty (c. 1122-249 B.C) displayed in British Museum showing high degree of patination; in case of noble patination remove only adherent loose material; removal of even layer of patination reduces the aesthetic value of the object, since the type and extent are useful indication of historical period; but in case of malignant patination both mechanically and chemically objects are to be treated; it can be done by abrasion, careful handling with tools i.e. brass, wire brush or pen-knife; after cleaning to protect object clean varnish can be applied to arrest further corrosion; it can be treated chemically specially in case of malignant patination 10% solution of acetic acid may be applied; carbonates of copper will disappear leaving red copper oxide; there are various ways to stain bronze objects.

Bronze Disease

The surface of ancient bronze objects are disfigured by unpleasant light green spots, either in the form of powder, or moist and pasty on the basis of the presence

of moisture and the spots are caused by salts resulting the impregnation of the surface of metal; designated Bronze diseases; prolonged soaking in luke warm water may sometime get rid of the condition if not cured a strong solution of either cold or hot of sodium sesquicarbonate can be used to care the Bronze Diseases; use of sesquicarbonate normally leave the patination untouched but remove all surface earthen or loose materials.

Bronzing

Plaster cast are coloured to represent bronze by painting with shellac varnish mixed with green powder colour or vandyke brown the important areas are highlighted with bronzing resulting the bronze colouration.

Brushes

Brushes of various types and kinds are necessary for conservation, preservation and restoration work; there is a specific type of brush require for a specific type of restoration work. Brushes used for oil painting are made of hog's bristles and red sable; these are usually flat; the best water colour brushes are usually of red sable and available in number of sizes The larger brushes are necessary for application of pigment in washes Flat and large brush are usually used for varnishing camel hair brushes are usually made of cow-hair and they are very soft. To use for restoration work they should be kept clean. Dusting brushes are superior to dusters and cloths. Brush made of glass fabrics is very useful for application of acids and other substances.

Buffing Wheel: A wheel covered with fabric which is charged with wild mild abrasive such as whiting used for polishing of metal objects.

Conservation of heritage building / Sites Considerable knowledge and proper assesment is necessary for conservation of old heritage buildings, if the heritage buildings or sites are of any historical value an architect of standing may be consulted; otherwise it would be risky to undertake any work of conservation; buildings may be classified into two categories; the past-and lintel type is one in which the weight of upper construction is carried directly either by load bearing walls or by columns and is which the main trustes exerted by the load carried in a vertical directions downwards The second type is based on the arch and the distribution of load is very complicated cracks in masonry or brickwork, dryrot or wood-worm in structural timbers and rusts and corrosions of structural metal are to be taken into consideration a house constructed with bricks may be said to be of post and lintel construction but the pitched roof exerts and outward of overturning trusts on the walls of the building; care is taken by adopting cross-ties, which prevents the rafter from spreading under the load of the tiles, cracks appeared in masonry work generally are indications that the structure has moved or started moving to considerable

extent; such movements are very slow initially but changes took place rapidly. In case of very old buildings the cause of weakness of fabric is due to age, but even such occurrences as a period of global warming and also dry weather, by causing a clay soil to dry out and to shrink may start movement; large cracks at the bottom than on the top indicate the movement of the foundation; if cracks appeared on the top then the walls are subjected to an overturning thrust.

A tell-tale consisting of a dab of cement over the cracks may indicate whether the movement has stopped; if the cracks widened further a system of shores should be erected without sacrificing the aesthetic value of the building; the timber framed building of the medieval times can move considerably if there is any movement immediate restorative measures may be taken to restore and consolidate and restore old building e.g. grouting cement, tiebars, screws, iron clamps shoring buttresses, retaining walls inserting steel rods; joists etc; exterior paints are to be restored.

Burr - Walnut This is a kind of walnut used for veneering.

Carbon disulphide or bisulphide

Volatile colourless liquid giving off an inflammable vapour; unpleasant smell; effective fumigant used in all organic material except those are colourful it dissolves fats, rubber, sulphur, iodine. It boils at 45°C; very powerful solvent for paint and varnishes.

Carbon- Tetrachloride

Non inflammable volatile liquid with a smell; an excellent solvent for grease and oil; an effective fire extinguisher; an effective fumigant as well as fungicide-without proper test it should not be used; in case of the treatment of any colourful objects; fumes are highly injurious.

Carbonic Acid

It is a mixture of carbon-di-oxide in water; always present in atmosphere in dilute form; weak acid effect mable and some other soft building stones converting surface layers into lime carbonate; if not protected properly damage objects leading to disintegration so far as the monuments are concerned it affects building materials.

Carborundum

(silicon carbide) Black in colour; solid hardness is very high; used in abrasive work for cleaning the external depositions on antiquities.

Carnauba Wax

Hard wax obtained from Brazilian palm; used for polishing; imparting hardness to a mixture.

Casein

Protein participated from curdled milk; used in preparation of palm leaves; there are number of recipes for gesso; gesso with casein require addition of preservative to protect objects from the attack of mould and other micro organisms; casein also used widely in painting in tempera colours and for preparation of palm leaf manuscripts.

Casting

Art of making copies from an original object; first making a mould then filling up with a suitable liquid; subsequently making hard eg molten bronze—hardens on cooling and plaster of paris which sets as a result of chemical action. Proper and good casting is a very worth work of a restorer; principles of casting (i) waste moulding when one copy is necessary; (ii) piece moulding, when number of sharp copies are necessary; (iii) gelatine moulding, for a number of copies, where greater sharpness is not important;

To make a waste mould the first step is to take a strip of clay about 5mm wide and erect it around the head, passing behind the ears so as to shallower than the front, mix small amount if plaster of paris with waters, plaster should be consistency of cream; could be started from the top; it should cover the whole equally to a depth of about 1/3 inch; surface should remain rough to act as a key for the next coat; as soon as the coat is absolutely dry it may be vaselined soft soaped; or oiled except for a space about 1/2 inch from the edges; care is to be taken not to leave an excess of oil; then mix bowl of plaster of stiffer consistency and spread it once to the existing coat; thickness may vary between 1/2 and 1 inch; depends on shape and size of the mould; in case of larger moulds sometimes hard galvanised rod are inserted to strengthen the casting; dry the casting strip of the clay walls and cut some tapering keys into that part of mould which join the back care to be taken to cut them at such an angle that they will not lock with back section; brush the edges with oil to prevent adhesive; cast the back in the same-way as the front portion; mould is now prepared when two portions are hard; to be inserted a broad blade hold the handle of the chisel gently with mallet; should not continue to lever at one spot; the back being shallow should come out easily; front part of the mould is cleaned by digging away the clay carefully, using a knife and wire clay-cutter; clean the faces of the mould; gently washing with water and by using soft brush; brush the interior carefully with soft soap solution and put two halves together, and rope them up strongly. It is to be decided whether a hollow / or a solid cast is required; few articles are cast in solid because the hollowcast is usually most satisfactory; which are joined up in various ways.

Celluloid

Celluloid is made by treating nitro-cellulose with camphor; at 100° C it could be moulded; insoluble in water but dissolved in amyl acetone, acetone and alcohol.

Cements

Cement refers to different types of adhesives includes paste gums, glues and indispensable to the restorer, suitable. The use of cementing material, in restoration work depend on the material itself and it is essential that the surfaces to be joined are being brought into close faithfully in case if the contact area is quite close the adhesive could take place to a greater or lesser extent without any interposition of cementing material, certain amount of pressure is necessary to hold broken pieces together until it is properly hardened. Adequate pressure will have to be exerted to squeeze excess cement out of jointly cement should be properly prepared for such restoration work. A glue or other adhesive which is very thick and viscous during the time of application could make a strong joint. To make proper restoration work selection of cementing material is extremely important so as to join the broken pieces together. To join broken or damaged antiquities certain ethics or international principles should be followed strictly. The broken or enlarged antiquities to be restored are to be cleaned and consolidated specially the area or areas to be joined to be cleaned with extreme care; any remaining material, adhesive clay, or other biodegradable things are to be removed before application of any cementing material; glues may be removed by soaking in luke warm water or suitable solvent or by a set of stonng resinous cement could be removed by the application of alcohol and celluloid cement could be removed with the application acetone or amyl acetate i.e. Durofix dissolve in amyl acetate or acetone celluloid cement is transparent and to be applied on the broken or damaged surface in thin layer after proper cleaning and after joining it should be allowed to dry which eventually could be rough & tough self supporting film Broken Glass can be satisfactorily restored, repaired, joined with it, celluloid cement can be made by dissolving small piece of "celluloid flakes in a solution composed of equal volumes of acetone and amyl acetate. Sufficient celluloid should be made for proper cementing solution. Application of cement to the broken edges could be done in the above manner and surplus material if any to be removed chemically or mechanically. The croid's Liquid Glue and seccoline are gelatinous adhesive is a fine glue and are useful for objects made of wood, although they could be used in pottery but such restorations are to be rather more visible than those made with Durofix. During the use of such material the surface to be joined should be lightly warmed a little to facilitate the glue to penetrate well in the interior porous areas of the object. Besides there are other cementing materials obtained from various resinous materials Fortafix, Canda Balsam used for joining the pottery porcelain glass etc. As a cement for broken glass the use of 20 oz is in glass dissolved in 1/2 pint of gin is useful. Scotch glue is one of the finest glue is widely used for joining the objects; ordinary glue is made waterproof by

adding linseed oil to hot glue 1:8 proportion. If $\frac{1}{2}$ oz HNO_3 for each 1th of glue is added the glue will remain liquid. A good adhesive for pasting paper to any kind of surface is as follow.

Chloral hydrate	5 grams
White gelatine	8 grams
Gum Arabic	2 grams
Water	30 cc.

Mixup properly in a glass container or porcelain and pour it over the water and to be boiled properly; allow to stand 36 hours and to be stirred at 2-3 hours intervals. Dextrine similarly is an excellent paste for mounting photographs and such of the materials as it does not 'cockle' the materials. A cement for joining marble may be 4 parts of gypsum (sulphide of lime) and 1 part of gum arabic. All the above ingredients should be mixed together and then with the help of 3% borax solution glue is formed may be used to broken surface for joining. It could take 4/5 days to set firmly, sodium silicate also could be successfully used for cementing porcelain glass. The edges of the broken material should be slightly heated before the application of adhesive and after application of adhesive it should be held firmly together and it is to be slightly heated; there are many efficacious cementing materials are used for the restoration work. Extreme precaution is necessary to allow heat a moderate degree otherwise sometimes colouring of materials if any on the object may be discoloured. Another cementing material made from caesin and water glass is considered to be an excellent adhesive for glass. An adhesive for rock crystal can be made from 8 parts of caoutchouc (rubber latex), 100 grams of gum masti and 600 parts of chloroform. The mixture should be stoppered tightly and set apart for about a fortnight. An adhesive for joining ivory object could be 1 : 1 parts guttapercha and pitch which are melted together, This should be applied to surface after application of light heat. Knockenplombe has been successfully used by china restorer. It is composed of 1 part of thymol with 2 part of iodoform at a temperature in excess of 72°C (162°F) At this temperature it is added with calcinoid bone to form a cement.

This can be shaped at per requirement. It set to become stone to room temperature. Another cementing material can be made from albumin by mixing egg white with slaked lime to form a paste. Finely grounded calcined oyster shells can be used instead of lime. A paste to cement leather is composed of

2 lb of good quality of wheat flour.

2 table spoonfuls of powdered gum arabic

2 table spoonfuls of powdered alum, adequate water to be added to it to make a thick paste. It should be heated lightly stirring the white until it is entirely

free from lumps. It is transferred to a basin, covered to exclude air until cold and then it would be ready for use.

To mount drawings the following cementing material could be used.

Gum arabic	4 _{oz}
Glycerine	1 _{oz}
Water	12 _{oz}

To prepare the solution gum to be dissolved in boiling water and small amount of glycerine to be added to it and to be stirred properly; cementing material for mounting precious stones could be prepared in the following manner

Gum mastic	10 parts
Isinglass	20 parts
Gum ammoniac	5 parts
Absolute alcohol	60 parts
Alcohol, 50%	35 parts
Water	100 parts

Gum mastic to be dissolved in the absolute alcohol and the mastic glass dissolved in the water by heating over a gentle flame in which two parts of dilute alcohol to be added and mastic solution to be added in the water, to be stirred thoroughly; finally add gum ammoniac solution; allow to evaporate the resultant liquid, using a water bath down to 175 parts. Gum ammoniac is a whitish gum resin collected from persian plant of the parsley family. It is very important that to restore such objects with cement in it would be necessary to apply some amount of pressure for proper restoration of objects. Cement should always be allowed to soak well into the joints of a porous article objects which are broken in number of pieces usually present number of problems in as much as it is rarely advisable to join 2 or 3 pieces together at one time. Each piece therefore must be fitted with great accuracy and with as little adhesive as possible. This could be applied with special force to such objects as broken terracotta pottery bowls and vases. There could be some human error if adequate protection is not adopted during the operation process. An excess cement could be wiped out or scraped away when the job is completed and the join is hardened. Excess celluloid cement should be removed with cotton wool and moistened with acetone or amyl acetate. Use of excess solvent could loosen the joint. It is sometime necessary to strengthen joints by using proper and adequate support, e.g. proclaim and pottery intended for cabinet display look best if it is cemented properly.

Chalk

It is calcium carbonate or carbonate of lime. If chalk is heated it will be converted into and it becomes calcium oxide or quicklime. When it is stalked with

water it produces hydrated lime. When hydrated lime mixed with sand forms the marble of the bricklayer. Lime mortar is now superseded by cement mortar. Whiting made from chalk which has been ground with water. The resulting product is used as a polish for such metals as silver and if mixed with glue water, it forms gesso or stucco. Precipitated chalk is an artificial substance composed of sodium carbonate to a solution of calcium chloride.

Chasing

The science of cutting designs into a metal surface with chisels, punches and a chasing separate lead chloride of lime (Calcium oxychloride). The popular name Bleaching Powder manufactured by the action of chlorine, on slaked lime. The chlorine can be liberated by adding dilute acids to the powder.

Chloride test

To ascertain presence of chloride (usually in the form of sodium chloride) the object to be washed in distilled water and few drops of solution of silver nitrate to be added to it, the liquid will become milky if there is a presence of chloride. Add few drops of dilute nitric acid, if the milky appearance remains the presence of chloride is confirmed.

Chlorinated Soda

(Solution of hypochlorite solution), With an odour of chlorine it is a colourless liquid. It normally contains 15% of the available chloride and is a bleaching agent.

Chlorine

Chlorine is one of the elements usually met in compound i.e. NaCl; but in its elementary form it is deadly poisonous greenish yellow gas having choking odour. Chlorine has got an affinity for hydrogen and quickly tends to unite with hydrogen in water, free the oxygen and it is from this that its strong bleaching properties arise. Chloride could be used as a bleaching agent but in all cases final washing with distilled water is desirable. To remove spots diluted small amount of chloride could be used.

Chloroform

A volatile liquid but not inflammable at ordinary temperatures. Because of its anaesthetic properties it should not be used in a confined space. It is a very good solvent for bees wax and an effective remover of some paint stains.

Collodion

A colourless liquid which evaporates quickly leaving an equally colourless film. The tough films which is normally even, smooth in character protect the objects and is made by dissolving pyroxylin in a mixture of ether and alcohol.

Colophony(resin)

A common resin obtained from pine trees and it is available as a mixture of resin and turpentine, which are separated by distillation. Rosin is dissolved by alcohol or chloroform. This is not now in use as an artists material.

Copaiba (copaiva balsam)

This is extracted from certain South American trees, consists of a main and a volatile oil having an aromatic smell. Sometimes this is used as vanishing oil pigments and as a vehicle for the pigments. It could help to revive dull colours specially for restoration of pictures. Copaiva Balsam mixed with rectified oil of turpentine in 1 : 1 proportions and applied in painting specially when the paint layer as darkened unduly, yield excellent results. The application of this solution may be repeated if it is necessary. After obtaining optimum result a final light cleaning with cotton wool pad soaked with turpentine oil would be very much useful.

Copal

A hard resin produced from some type of Indian and African trees. It is normally transparent of a tawny yellowish colour and partly soluble in turpentine oil or linseed oil at ordinary temperatures. When the solvents are heated however the resin completely dissolves. As a varnish material this is being used from a very early period and to remove it from early paintings it is a very difficult task. To remove, copal varnish, dissolve a small quantity of copal mixed with linseed oil in low temperature is very useful practice. Diluted with turpentine and add a little quicktime to accelerate drying process is being adapted Copal varnish can of course be bought ready for use. The problem relating to the use of Varnish liable to crack with the passage of time and it is not normally used for restoration of oil paintings.

Copper

Except in the earliest times more or less all the objects of artistic interest were made of unalloyed copper. During bronze age however copper was used for article of aesthetic interest. Use of bronze began when the superior properties of a copper-tin alloy were appreciated. Copper is a lustrous metal, reddish brown in colour, ductile and malleable, i.e, can be made to wire and widely used in domestic purpose, the fact remains that copper is like silver, an extremely good electrical conductor, makes it an excellent metal for use as a foundation for electroplating copper implements were used Coral: The skeletal remains of coral polyp colonies. They are mainly available in warmer seas such as mediterranean, and coral is mainly composed of Calcium Carbonate, used for various decorative and article purpose. The deeper red corals are more valued than pink varieties.

Corrosive sublimate (Mercuric Chloride)

Corrosive sublimate is highly poisonous and diluted solution can be used for the purpose of sterilization, killing moulds, fungi and such other macro and micro-

organisms. Normally it is mixed with solution paste or glues so as to protect the objects from the attack of macro and micro organisms, and also arrest infestations.

Cracks in Porcelain Cracks appear in porcelain objects and to ensure protection the dirt is to be removed and to be covered with a cotton wool pad, saturated in a bleaching solution. It is to be kept there for several days and at a definite interval bleaching solution to be added to it with the help of selective soft brush, could improve the condition of the object.

Damascening

Craftmanship metal workers of Damascus widely practiced this method. The design is cut into the metal with a graving tool which leaves a groove of triangular section opening on the surface at the apex. Gold or silver wire is being hammered into the groove. The above procedure is also called "Watered" appearance attained by hammering rods of iron previously soldered together into a homogeneous mass.

Dammar Resin

Dammar resin obtained from trees *Agathis dammeris*. The resin is dissolved in turpentine to make it a varnish, available both in hard and soft form. It also dissolves in alcohol. It does not affect or discolour as in the case of other varnishes.

Diorite

A rock of somewhat coarse grain having speckled surface of black and white. Diorite is extremely hard and was much valued by early people for a variety of purposes.

Driers

Substances added to oils specially in paintings to speed up the process of drying. Various substances are used for this purpose i.e. cobalt linoleate, made from cobalt and linseed oil. Lead oxide and manganese oxide, zinc oxide are also used for this purpose. The problem of using driers are some pigments dry more quickly than others. Flake white is used as exceptionally rapid drier; prussian blue, the umbers, burnt sienna also used for this purpose. On the other hand ivory black, emerald green and vermillion are extremely slow driers. These slow driers could be converted into fast driers mixing with them some of the rapid drying colours; usually very small amount of driers is needed not more, in fact, than 2% of the medium and its use should be restricted underpainting.

Dry rot

Stagnant and humid air provide the optimum conditions for the fungus resulting in serious decay of wooden work called 'dry rot'; affected wooden objects make the wood dry and powdery; if not treated in time the objects may be converted into powder, followed by soaking in hot paraffin wax.

Dyes

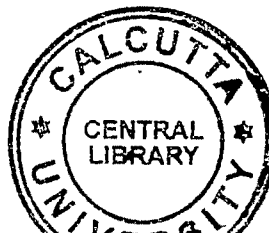
Colouring of fabric is an art called dyeing; dyeing are commonly used for such material ie wool silk, jute, cotton, linen, leather etc., may be classified (i) natural dyes obtained from animal and vegetable sources eg, Tyrian purple indigo etc. (ii) mineral dyes obtained from minerals i.e. prussian blues from cyanide of iron (iii) synthetic dyes usually derive from coal-tar. In addition to dyes normally dissolved in water some fabric (cotton) require mordants, and the shade of the dyed article can often be governed by the mordant used. Some dyes are 'fugitive', and as a result lose their colours and with the passage of time and specially with the exposure of light. Some dyes are not fast specially when an object with fast dyes immersed in water will tend to loosen the dye stuff from the material and to wash it out; extreme care to be taken to preserve the dyed objects in a museum.

Egg as a medium of Painting

Egg yolk is commonly used as a medium of tempera painting (q.v) with or without the addition of oil yolk contains an oily substances equivalent to about 1/3 of its components. Egg white has been widely used as a medium, especially on illuminated as a temporary protective varnish, it is soluble in water.

Electrolysis

To restore conditions of various types of object it is sometimes necessary to take the help of the electrolysis process. In the process of electro-plating we take the advantage of the fact that if a silver plate is connected to positive pole (anode) of a single cell, and article to be plated to the negative pole (cathode), both being immersed in a solution containing silver nitrate and Potassium Cyanide (a.v.) the electric current will take metal from the plate at the pole and deposit it on the article at the negative pole, the thickness of electroplating is dependent on time during which it is left immersed in the bath. It is to be seen that the object to be plated is entirely free from grease or any other impurities. Low voltage is necessary for small objects but in case of big object it depends on the total surface area of the object. To prepare a museum object for replating, e.g. in case of silver object the old silver to be cleaned first leaving the object for electrolysis. To prepare the solution for the bath 75 parts of silver nitrate in 5000 parts of water and 125 parts of potassium cyanide is necessary. The bath should be of glass or porcelain, and large enough to allow both anode and cathode to be completely immersed in the above solution. A piece of silver in the positive pole to be provided and connect the object which is necessary to be replated in the negative pole. It is necessary to ensure proper electric connection for proper replating. If the voltage fluctuates or there is high voltage the anode will be turned in black; if it is too weak, the anode will become white. Electrolysis is now employed for restoration work for copying bronze objects and other metallic objects.



Electrotyping

It is a method for copying an article in metal in facsimile. So far as work of art and antiquities are concerned bronzes can be made in the above method. The first step is to make a mould the surface of which is created with black lead. A wire is taken from the black leaded surface to one pole of an electric battery and from a copper anode to the other pole and electrolysis is being done.

Electrum

The word is usually applied to a natural alloy of gold and silver; percentage of gold varies between 50% to 85%. It is limited to an alloy which is pale yellowish in colour; widely used in ornaments and for overlaying wooden decorative objects.

Emulsion

It is a mixture of oil and wax or other insoluble substance mixed with a liquid on such a way as to consist a suspended drops evenly dispersed throughout the liquid, the mixture being stable and tending to separate this is termed as emulsion. Milk is typical emulsion.

Emery It is a mixture of corundum magnetic and other minerals. It is extremely hard and is needed as an abrasive in the form emery cloth powder, blocks, wheels etc.

Enamels

A hard glass like substance which is fused on to the surface of the metal objects. It is a type of glass to which various colouring agents in the form of metallie oxides are added. The pigment used for decoration pottery and porcelain made in this process and are also termed as 'enamel'. Enamels (including poltery colours) may be either opaque or translucent. Opacity appeares result of adding oxide of tin, Enamels on metal surfaces are classified into three principal kinds champleve enamels; cloisonne enamels and painted enamels.

Champleve

Enamels are those in which cells are first to cut into the metals, the depression thus provided being filled with the enamel paste. Firing in a porper kiln then melts the paste into a glass. Cloisonne enamels are those in which the cells are constucted by soldering fine wire to the metal surface, the compartments thus creative being filled with enamel paste as before. Painted examples are those in which the design is painted in colours on an enamel back ground some what analogous to the process in which enamel decoration is carried out on the surface of the pottery and porcelain; enamel objects could be washed in water and soap with the help of soft cloth or brush; if restoration of enamel is necessary, a good permanent oil paint is most effective. Translucent enamels could be imitated by adding a little of an appropriated pigment to a syrupy solution will dry into a firm, translucent material which could be a possible replacement of the missing enamel.

Engraving

The art of on a object with the help of incised line is normally done on metal and an impression of an engraved plate on paper is also termed as engraving. The art of engraving is seen since Pre-historic period. Stone age engravings on bone and ivory have frequently come to light and some of the ancient decoration on pottery was engraved. Engraving in classical period was a developed art e.g. bronze mirrors of the Romans decorated in this way. It may be said that discovery of printing from engraved plates could only have been delayed for want of proper ink. Lamp black and oil was the first ink of this kind. The earliest known engraving being printed in this way was the work of a German Artist in the year 1446. It may be divided into two sections, that was done for its old cloacks, the Roman mirrors already referred to domestic and ornamental plates etc. and the engraving of plates for printing purposes copper plates were largely used for engraving work, copper is soft and burin raises a burr along the line of the cut which holds the ink and lends depth and richness of line of the cut which holds the ink. This is seen in the 'dry point' process. The mezzotint is a later process than the line engraving in which chisel is used to raise burrs over the entire surface. It will be seen that a uniformly burred plate would give a deep, rich black impression, where as parts smoothed by the scraper would take little or no ink, on the basis of the degree of scrapping. In this way tones are formed.

Etching

The term etching is generally used to refer to the art transferring a design to a copper plate by means of acid for printing purpose. The plate is covered with ground to be obtained from any good firm of artists, suppliers and the design drawn through the ground to the plate beneath with an etching needle. Upon immersion in an acid bath (which is either of HNO_3 or a mixture of H_2SO_4 , potassium bichromate, and water) the design is bitten into the unprotected parts of the plate; when some parts of the design are to be weakly etched the plate is lifted from the bath after a period, washes and such parts stopped out with varnish; the plate then again immersed to continue the process on the unstopped parts. The plate is used for printing by wiping it with ink.

Ether

Prepared by the action of H_2SO_4 on alcohol. It is a colourless volatile liquid boiling at 35°C ; highly inflammable; forms an explosive mixture with air; It has also narcotic properties; used as cleaning agent; and extremely powerful solvent for paints and varnishes.

Ethyl Acetate

An inflammable solvent similar to the properties to amyl acetate. (q.v)

Feldspar

A group of silicates which form the principal component of plutonic (eg. granite) and volcanic rocks; it is decomposed with weathering into kaolin (china clay) and petuntse (growan stone), which are the most important ingredients used in porcelain making. Pure feldspar is colourless but becomes tinted by the occurrence of various minerals as impurities, largely used in art work.

Fixtatives

These are used to protect drawings in pastel, pencil, chalk and charcoal from rubbing. They are applied as a spray and are usually made from alcohol in which it has been dissolved about 2% of resin as mastic or copal.

Fly marks

These are due to deposits of the excreta of the common house fly. The diet of the fly has something to do with the best method of removing the marks. Unless the article is usually delicate, a stout needle or a fine bladed knife could be used to remove most of the marks, leaving a slight stain which may be dealt with by some such bleaching agent as a solution of chlorinated soda (q.v). If the fly has been on a oily or greasy diet, a little pyridine with a small could be applied on the mark to remove the stain. Besides alcohol petrol or benzene serve almost equally as well.

Formalin

40% solution of formaldehyde in water is a powerful antiseptic, deodorant and preservative. Sometimes added to a paste as a preservative against decomposition by bacterial action.

Formic Acid

An acid derived from methyl alcohol, it acts as irritant of insect-stings, nettle-stings etc.; can be used for cleaning silver object (q. v)

Foxing in Prints and Drawings

Fox marks are reddish brown spots to be seen on prints, drawings and archival materials. There are several methods for removing fox marks. Immersion in a fairly strong solution of sodium chlorate, followed by washing in clean water, has often been used with success. A solution of equal quantities of hydrogen peroxide and absolute alcohol applied with fine brush will often deal with the trouble. It is essential to avoid welling the paper, chlorine gas is, from a bleaching standpoint, quite safe and efficacious, but it needs to be used with care and in a well ventilated room.

French Polish

Artificial polish or finish used in the surface of the furniture introduced in 19th century and it may be obtained for use from the colour merchant. Before using french polish the damaged surface should be washed with warm water mixed with soap flakes; and this should be repeated again after 24 hours. After washing and drying

in normal temperature original french polish mixed with the following solution may be applied;

Alcohol	5 parts
Linseed Oil	2 parts
Turpentine	1 Part

French polish may be stripped off by washing the surface with strong liquid solution with acetone or with varnish remover.

Fresco

Wall painting executed with distemper or gouache colours on plaster while it is still wet. The plaster is made from lime, sand and water. The lime could be prepared well ahead prior to use. Earth and mineral pigments are always employed since they could resist the chemical action of the setting plaster.

Fruit- Wood

The word of such food trees as pear, cherry, apple etc were used for inlaying in the antiques furniture; and are prone to insect attack.

Fuller's Earth

This is a hydrated compound of silica and alumina with a smooth soapy feel.

Furniture Repairs: Old wooden antique furniture

The question of repair and restoration old furniture could be legitimately carried out is a million dollar question but it may be said that the least amount of replacement of old wood is sometimes necessary to arrest further degradation and deterioration. If the antique furniture is badly damaged specially the polish. It is possible to put them back into the original condition by stripping the damaged surfaces followed by oiling and treated with bees-wax and turpentine, the patina of the bygone days will be missing. There could be many legitimate alterations specially those are badly damaged; to do the nature polish; the grain of wood are to be taken into consideration; broken veneer may be replaced with matching pieces; looser joints are to be glued matching the earlier one; parts of mouldings and carved enrichments if missed or damaged then after matching the grains seasoning the wood to be refixed with suitable glue; followed by repolishing.

Gelatin

A protein substance obtained from boiling animal cartilage bones; easily, soluble in water and widely used in restoration work.

Gesso

Used as a ground material for painting; obtained from gypsum, chalk or whiting, to which glue, gelatin or casein is added as a binder; 4% formalin solution is added if necessary for restoration; a recipe for preparation of gesso is done by talking

equal amount of gypsum plus glue water mixed with zinc white; used on the surface on support in thin coats may be necessary; preceding before the application of next coat china clay (kaolin) in powder form may be used instead of gypsum, chalk or whiting. Tempera colours are usually used on gesso ground; sometimes carved mirror or frames or picture and antiquities are covered with thin layer of gesso to receive the gold-leaf.

Gilding

It is an art to cover materials with a thin layer of gold. This is known from very early times; gold used by the Romans in the form of thin sheets or leaves, caused to adhere to the antiquities in variety of ways. Copper was gilded after cleaning the metal carefully to get rid of any adherent grease; which was followed by careful polishing; then covered with thin layer of mercurry; copper and mercury combines easily; by heating mercurry is removed and the gold polished to bring out the colour. The combination of gold and mercurry used in porcelain for gilding. Picture of mirror frames are prepared by covering the wooden base with several coatings of a mixture of whiting and size; after hardening it is covered with a thin coating of gold size on to which the gold leaf is pressed followed by suitable varnishing materials; for water gilding, the work is first sized; after drying the leaf is laid on with water, followed by suitable varnish; the gold is first reduced to a fluid stage by dissolving the mercurry; fire gildings are effected by applying an amalgum of gold with mercury to the object after wards volatilising the mercurry with heat; cold gilding on silver is done by dissolving the gold in aqua regia. A piece of rag is dipped into the solution, burnt, and the ashes rubbed on the silver. Gilding sometimes needs burnishing. An agate or bloodstone burnishing commonly used followed by a thorough washing with vinegar.

Glass

Glass is in many ways resembles a liquid and as a material is less permanent than actually it is felt. The scratch surface of glass and porcelain can be partly restored by rubbing with chamois leather impregnated with jewellers rouge in the glass can be restored partly in the above process; but some scratches which are evidence of by gone days may be allowed to retain, in case of any deposition of soluble salts it should be removed with the help of 5% sodium hydroxide followed by thorough washing with running water; to remove organic stains on glass gentle scrubbing with soft brush and a 5% solution of ammonium carbonate is usually used. Some metal polishes usually polish glass; a good polish of this nature can be made by adding calcined magnesia to benzene until a semiliquid mass is formed; used for polishing mirrors, picture glasses, and windows; washing in a dilute solution of ammonia followed by drying and cleaning is done to clean glass objects; glass objects which has been clipped particularly in rim can be ground in some ancient

glass objects has deteriorated to a considerable extent; one of the reasons for this condition is condensation of on the surface of glass of moisture having CO_2 resulting decomposition with the formation of sodium carbonate and calcium silicate; objects suffering from such problems may be washed thoroughly with distilled water spraying with celluloid varnish culling tools through wax and dip in the hydrofluoric acid. The acid will bite into the exposed surface of the glass and then it has to be taken out of the bath; washed in running water and the wax removed.

Glue

The glue pot is very important element for furniture-restorer. There are various types of glue used in restoration work. Scotch available in the market may be used in restoration work. Glue must be applied thinly and well brushed in; to get excellent results furniture joint should be pressed together with cramps wherever possible until it is properly hardened. Glueing may be done in a warm atmosphere.

Social Accountability of Museum

ATUL CHANDRA BHOWMICK

In classical times museum signified a temple dedicated to the Muses; nine daughters of Zenus (the Roman Jupiter, king of gods) and Mnemosyne (memory) and nine young goddesses, namely, Calliope, the Muse of epic song, Clio the Muse of history, Enterprise Muse of lyric song, Thalia, the Muse of comedy and idyllic poetry, Melpomene, the Muse of tragedy, Terpsichore, the Muse of choral music and dancing. Erato, the Muse of erotic poetry and mine, Polymnia/Polyhymnia, the Muse of serious sacred hymn and Urania, the Muse of astronomy. History notes that the first organized museum was founded at Alexandria, Egypt in about the third century B.C. in 288 by Ptolemy Soter. It was destroyed during civil disturbances 600 years later. The museum had some objects, but it was primarily a university or philosophical community and philosophy in those days referred to all knowledge. It was an institute of advanced study, supported by the state, with many prominent scholars in residence. Euclid, about 300 A.D. headed the mathematics department and Ptolemy, Greek mathematician, geographer, astronomer of 2 B.C., Archimedes and Eratosthenes, who were actively/engaged in research and philosophical speculations, Hero and Pliny, who had specimens for some of the descriptions recorded in his comprehensive natural history. Museums are the storehouses of knowledge or knowledge institutions. Following the early museum that focused on education *ceteris paribus* there was a long lull period of collection. The next period of museum development is associated with the renaissance. The changes in collecting at that time, beginning in the 14 century and continuing through the 16 century, paralleled the advancements in the fine arts and sciences. It was a time of great change that saw a revision of world thinking. The thinking was shifted from a societal-centric to a human-centered universe. The change today is from human-centered to global. This early museum was merely the repository of a few valuable antiquities acting as the custodian of treasures. It accumulated objects of momentary value and curiosities for their uniqueness. It was some sort of a graveyard of the past. In that stage only scholars and elitists were monopolized to use these collections for the purpose of their study and to enjoy, The collection had practically no connection with the common masses, unless the visitors on their own had visited the museums. They seldom visit the museum on their own. Social accountability was not a declared objective of a museum at its early stage. This was the early stage of museum formation when all objects irrespective of types pull all together in one museum. This was the storehouse phase. The objects were put on view and

it was the phase of service to a few and then the material objects collected in a very selective ground were displaying to all the general public ushering a phase of education for all avocationally from the expositions ready at hand and this trend is accepted widely nowadays. Museum display is a non-decorative graphic presentation with symbols and signs for aesthetically visual appeal and appreciation, even occasionally tactile, while presentation is a decorative commercial activity and it thus opposes museum display. Museums are sources of inspiration and give on-lookers a lasting impression about the collected objects, which they viewed round the galleries. For viewing all galleries they dragged their hobnail boots and clattered their heels along the shining floors. Of course, some visitors wander aimlessly through the galleries. Inexpensive polyglot catalogue and monochrome and polychrome picture post-cards serve the purpose as well. Even album of selected paintings, sculptures, calendars and greeting-cards can serve the purpose. The educational importance of museums is being realized all over the world and now considered museums are the best vehicles for dissemination of knowledge by contemplation objects. Practically objects transubstantiate into knowledge. To fulfil this aim museums arrange authoritative, taxonomic and positivistic extensive pedagogical programmes to the visitors for arousing of curiosity to widen the horizons of experience. Saturday classes may be held every week for possible configuration of knowledge on painting, sculpture, puppetry, etc. to interested members of the society. Any interested persons can borrow framed reproductions of masterpieces of paintings and art books for certain days, for example, for 15 days and this process seemed a most effective way of exposing the borrowers to admire enthusiastically the art objects and to have a fascinating experience and titillate visitors to come once again to museums for studying the collected material artifacts for building up a body of national knowledge and wisdom. As it is based on real objects, it is therefore correct. But gradually with the change of time it grew as an institution to impart knowledge open to all, which ordinarily a non-profit making permanent institution and acquires, conserves, researches, communicates and exhibits for the purpose of study, education and enjoyment of the people, as a result of which the visitors could get pleasure and profit according to their inclinations, because a conscious society felt that people within it should know about their history, geography and also their own behavioural patterns and diversities. The society feels the urge to know all about their art, history, cultural heritage, religion, faith, beliefs, rites and ritual, customs, inanimate and animate biological items in their innate surrounding prevailed around them for study and enjoyment. Museums are centers of edutainment. For proper understanding keenly observation and inspection of original material evidences of man and nature is indispensable. Of course, for proper fulfilment of these formal academic courses run by schools, colleges, universities and libraries, however diverse the subjects may be, are of great help. Hence, for

visual experience, comes the necessity of museums. Of course, only visit to museum collections may fulfil one's knowledge partially and studying in an educational institution, partially. So, the museums and the educational institutions when jointly work together can result to understand the significance of any object and this in total entails a complete knowledge at large about the objects. Sir Asutosh Mookherjee had explicitly pointed out in his inaugural address in the centenary celebration of the Indian Museum, Kolkata on 28th November, 1913 "the museum may be regarded, first, as an adjunct to the classroom and the lecture room; secondly, as a bureau of information, and thirdly, as an institution for the culture of the people." Again, "it is unquestionably our duty to do our best for the culture of the of the public, through the display of attractive exhibition series, well planned complete, and accurately labelled, and thus to stimulate, and broaden the minds of those who are not engaged in scholarly research." He further mentioned, "a National or Imperial Museum must, consequently, be equipped adequately for the fulfilment of three principal functions, viz., first, for the accumulation and preservation of specimens such as form the material basis of knowledge in the Arts and Sciences, secondly, for the elucidation and investigation of specimens so collected and for the diffusion of the knowledge acquired thereby; and, thirdly to make suitable arrangement calculated to arouse the interest of the public and to promote their instruction."

After the World war I (1914-1918) from 1918 museums began to be realized as the centre for spreading education even to the common people. But the social responsibility of museums was flowered after the Second World war (1939-1945) and people become more conscious of the dictum – Museum for all.

Democratization of museums is a sign of social consciousness nowadays and the museums are acting as the bridge linking the past and the present. Collected museum objects are no longer considered as lifeless, but these are seemingly living specimens as if speaking their values to the people. Their social accountability is thus an accepted concept of the society. The ICOM is defining museum under Article 2 Para I in the 10th General Conference, held in Copenhagen (Denmark) in 1974 clearly mentioned museum as 'a non-profit making, permanent institution in the service of society and open to the public.' To fulfil this idea Neo-Museology, the prefix Neo (new) is offing off from Museology as its corollary and it attains a great success to this point of view.

Museum collection is attractive, easily accessible and well designed for support these activities and comfortable for both teacher and students. Teachers want materials to demonstrate the topics and if needed experts can assist with books, objects and documents of various kinds and exciting visual aids to excite and stimulate the students.

Neo museology is trying to involve people in planning and running a museum

and consequently it provides scope to local community's involvement in its function as does an ecomuseum. This branch is integrated to the life of people and becomes a useful cultural centre, playing a positive role, facilitating people to understand well the society and their social behavioural pattern. As a result the mobility makes it more dynamic to solve the aspirations of the people. For an example, when a museum has exhibited the traditional and modern agricultural implements the on-lookers can view for themselves the different varieties of native plough, harrow for breaking clods on ploughed field, leveller, different processes of tilling the soil for varied characters of soil in different ecological milieu, sowing machines, weeding and harvesting equipments, like, weeder, sickle, paddy thrashing, husking lever, winnowing-fan, granary, insecticide, pesticide, foe and friends, like, insects, locust, earthworm of cultivators. They can select of their own the advantages of the improved methods of cultivation in comparing the merits and demerits of the traditional old processes and the modern developed methods of cultivation and can adopt the best one for their easy sustainable way. The community can adopt the improved agricultural tools and the experiences they gained after using such tools usher economic progress of a country. Now a new concept Economuseology has emerged and the term was coined by Cyril Simard. It concerns about the dying material culture of a particular region. This branch of knowledge aims at giving training to artisan craftsmen to revive the traditional arts and crafts of a rich aesthetic value of a particular locality and to preserve these for the future generations to come. The virtual museum is not a conventional museum having material objects in its collection, but it is a storehouse of computerized data with internet facilities to cater information about collections accumulated in different museums situated in different parts of the world and thus it makes the whole world into a global village. Ecomuseum conserves the community's collective memory and extends to the documentation of the traditional ceremonies and social relationships and physical sites and becomes the local identity. An ecomuseum recognizes the importance of culture in the development of self-identity. The eco-museum concept goes beyond the traditional museum idea of collecting objects to establishing conditions for communities to learn about themselves. Hugues de Verine, a French museologist and the former director of the ICOM coined the term 'ecomuseum' in 1971, but it was Georges Henri Riviere, the pioneer architect of ecomuseums in France identified distinctly in 1985 its contents and the core functional activities. The prefix 'eco' is derived from 'oikos' (GK) word meaning a house or a living place or a habitat. So, the word ecomuseum indicates a spatial relation interconnecting biophysical and human activities, like, agriculture, hunting, fishing, festivals, customs, professional crafts, e.g. wood works, basketry, traditional pottery, textiles, folk dolls and toys, hair-do, territory, ecology, soil, temperature, rainfall, flora, fauna, water sources, population of an area, cultural values, tradition, heritage, etc. So, ecomuseum is a mirror or

prism in which the local population views their own image, industry and territory. It thus becomes a tool for the economic, social and development of the society from which it springs. 'Knowing the land' is the motto of an ecomuseum, which creates practically a sense of belonging to the place and highlights the wholeness of man encompassing the land and the people. It situates man in his natural environment portraying nature in its wildness. Ecomuseum acts as a laboratory to conserve, to protect and to study the past and present behaviour of a population of a particular geographical area. This ecomuseological approach advocates a democratic functioning and to preserve people's own cultural heritage. In this sense ecomuseums act as self-employment oriented multipurpose activities centres.

Ecomuseums are designed to preserve economic viability and included facilities to document the areas' histories and for community meetings. N. Fuller in 1992 expressed that this type of museums acts as a vehicle for community empowerment. These neighbourhood museums gained popularity in the 1960s as agents of change that linked education, culture and community development. Eco-tourism/eco friendly tourism/bio-tourism can develop to a certain extent the growth of an ecomuseum. The first ecomuseum in India is the Korlai Community Museum established on 23rd January in 1999 in the Raigarh district of Maharashtra in a small village Korlai on the coast of the Arabian Sea, South of Revdanda town, about 126 km. south of Mumbai. No ecomuseum was established in India here before. Korlai village is inhabited by a small community of Indo-Portuguese and the museum was initiated by V.H. Bedekar, Professor of the Museology Department of M.S. University Baroda. The Ananda Niketan Kirtisala at Bagnan in Howrah district of West Bengal was valuable contribution for the development of the rural community of the area. It was founded in 1961 and is situated in a typical Bengal village with natural surrounding. The museum is run by a local executive committee. As the museum personnel are mostly the local persons, they have a close relation with the local inhabitants. It is very easy for them to create public interest about the museum and as they know the local problems museum functions are mostly organized accordingly. They try their utmost to tackle the local problems, like, agriculture, animal husbandry, public health in their own interest. The Gandhi Smarak Sangrahalaya, Barrackpore organized a travelling exhibition at Greruphadi at Garifa in North 24 Parganas, West Bengal to spread Gandhian thought to lay public. The museum has undertaken an action - research programme - balwadi, a children's preparatory school for the economically and culturally downtrodden slum-dwellers near the museum for cultural change as per Gandhian thought with children belonging to both economically and culturally deprived families living in the slum areas near the museum to experiment with Gandhiji's idea of cultural change. The *satras* (different *Vainava* sects monasteries) institutions of 16th century A.D. e.g., Sankaradeva (1449-1568), Madhavadeva (1489-1586), Damodaradeva (1488-1598) in Majuli island,

the biggest river' island in India, measuring 880 sq.km. comprising Garamur and Kamalabari townships and 244 villages, in India are functioning as ecomuseums. The largest river island in the world is the Ilha do Bananal, 20000 sq.km. formed by Bat-co maior and Braco menor channels of the Araguaia river in Tocantins State in Brazil, South America as mentioned by Joshua Calder'. The Majuli island of the Brahmaputra river is situated in the district of Jorhat in the upper Brahmaputra valley in Assam. The exact number of such *satras* in Assam is difficult to ascertain. S.N. Sarma listed 380 *satras* in different places of Assam, while Ramcharan Thakuria believes the number is about 650 and all are regarded as heritage sites. The *satras* are residential and the *bhakats* (devotees) of the *satras* collect objects mainly from their *sisyas*' (disciples) houses and preserve the age old *satriya* culture and tradition of Assam in traditional *satra* architectures. These institutions are also the repertoires of traditional objects used by Mising, Deura/Deuri and Sonowal Kachari tribes living in the same locality and the objects of the artisan groups e.g., the *Kumar* (potter), *sudra* Kalitas, the traditional craftsmen of terracotta art and crafts along with the *Vaisnava* articles. These include the religious articles of great potential value, visual and performing arts, vocal and instrumental music *bihu* dance, *kalinach*, percussion musical instruments, e.g., *khol* (drum), *daba* (big drum), *negera* (kettle drum), *ghanta* (bell), *kahh* (gong), stringed instrument, e.g., *tokari*, blowing instruments, e.g., *sankha* (conch), *kali* (long pipe), striking instrument, e.g., *tal* (cymbal), *thogi* (platter for keeping the *Bhagavata*), decorative tray *sarai/sara* (platter), *boha* (wooden cup), *kariya* (wooden pots with outside cane bands, used in milking cows), bamboo work, e.g., *bicani* (hand fan), cane work, e.g., *kath* (mat), pith works, e.g., *mukhas* (masks), puppet, typical *dhoti*, turban, Assamese *gamocha/gamcha* (towel), *gamkharu* (bangle of women) and the structural parts of typical *satra*'s architecture, e.g., *batora/karapatt/toran-griha* (entrance gateway, usually with painting, *carihati* (*cari* means four, *hati* means cloister), *namghar/kirttan-ghar*-(prayer hall) and *manikut* (jewel house), *khutas* (pillars), wood carving of godly image kneeling *Garuda* with folded hands, gatekeeper *Hanuman* and *Jaya-Bijaya*. The *satriya* music tradition carries a set of *raga* (melody) songs, called *bargit* (bar- means big, *git*, song) which is lyrical composition done by Sankaradeva and Madhavadeva during the *bhakti* (devotion) movement in medieval India. The *bargits* are *Brajabuli* language, an admixture of Maithili, early Assamese and western Hindi and these are sung by *gayans* (singers) accompanied by *bayans* (instrumentalists) – *gayan-bayan*. The verbal arts, like, myth, legend, tale, proverb, riddle are performed through oral-aural processes as oral folk literature. Tribal collections are the model of raised platform house, *deuri jatar* (spinning wheel), 100m, missing bird, butterfly and star studded motif traditional *saris*, *pepa* (blowing horn), *Kumar*'s pitcher, wheel, dolls and toys and terracotta *Garuda* – all are sense of place. The Presquile Provincial Park Museum, Canada is an ecomuseum. A graphical representation of heritage

and ecomuseum relationship is represented in this way (Fig.1).

Chitrashalas (Art galleries) in the *Ramayana* and in the classical works of Vyasa, Kalidasa, Bhavabhuti and *Vinayakapitaka* (400 B.C.) we find mention of 'hall of paintings'. Hindu ancient temples, like, *Vishnu Jagannath* temple at Puri, Lingaraja temple at Bhuvaneswar, Sun temple at Konarak, Orissa, Somnath (Patan) temple of Gujarat, Kailasanatha temple, Maharashtra, Kandariya *Mahadeo* temple, Madhya Pradesh, Belur temple, Badami temple of Chalukya style, Venkateswar temple at Tirupati, Andhra Pradesh, Minakshi temple at Madurai, *Siva* temple at Rameswar, Brihadeswar great *Saiva* temple at Tanjore, with lofty *sikhara* (tower), consisting of 14 storeys, rises to a height of 190 feet, crowned by a massive dome consisting of a single block of stone and covered from the base to the top with sculptures and decorative mouldings, built by Rajaraja, the Great of Pallave dynasty and Hoysalasvara temple at Halebid (Dorasamudra) in Mysore, Karnataka, elaborately carved with a succession of 11 running friezes, about 700 feet long, of elephants, tigers, scrolls, horsemen and celestial breasts and birds. The entire surface is covered with sculptures. The lowest frieze, for example, contains no less than 2 thousand elephants finely executed and most of them with riders and trappings. The Hoysalesvara temple is one of the most marvelous exhibitions of human labour to be found in India. This is best example of the Hoysala style having the essential characteristics are high plinth, which all the windings of the temple and thus offers a huge length of vacant space to be elaborately carved with sculptures and pyramidal *sikhara*, but low. The Bharhut, Central India, Sanchi at Bhopal, Madhya Pradesh, Amaravati (200 A.D.) in Guntur district, Andhra Pradesh, Sarnath, Uttar Pradesh *stupas* with ornate panels depicting the life of Buddha, the great Buddhist monastery at Nalanda, Bihar, *chaitya* caves at Karle, Bhaja at Nasik, Mumbai, Bedsa, Ajanta, Andhra Pradesh, Ellora Kailasanath temple in Aurangabad, Maharashtra, world famous, constructed by Krishna I of Rashtrakuta dynasty in the latter half of the 8th A.D. and is a marvelous specimen of the Dravidian style. The Dilwara Jaina temple, Rajasthan, Mahabalipuram/Mamallapuram, Tamilnadu *ratha* cut out of a rock-boulder, island of Elephanta, Mumbai, Udaygiri, Khandagiri, Orissa rock-cut cave temples, Yogimara, Central India, Bagh caves are considered as open-air museums. These ancient structures are the storehouses of precious treasures, like, paintings, ivories, textiles, wood-carvings, cut glass chandeliers, musical instruments, palanquin, *howdah* and they served the purpose as do by museums, though they did not fulfil all the characteristics of present-day museums. Earlier temples offer scope for seeing, touching and hearing, for these are most effective to cater education to viewers. They know the deeper truth of the objects. But nowadays museums do not allow visitors to touch objects and labelled 'Please do not touch' for saving objects from damage. The monastery of Nalanda was a

famous academy of arts, science and medicine, teaching the *Vedas*, Hindu scriptures, philosophy, logic, grammar. The Jaina *Bhandar*, Kota, Rajasthan and the Ramnagar Fort, Varanasi, Uttar Pradesh of Maharaja Chet Singh has a *Saraswati Bhavan* for keeping thousands of manuscripts including a *Panchnama* having Goswami Tulsidas' signature. These were seats of learning and have vast collections of painted and illustrated manuscripts. All these splendid elaborately carved temples foster education on Indian social life and thus their social accountability is like the museums of today. These community centres had always been and continue to be, a great cementing factor to the social life of people.

The viewers circumambulating the temples view the sculptures and reliefs of the temples and gather ideas about the presiding deities mythological stories and thereby enrich with knowledge about religion, art and social events in a pleasurable manner, which is one of the declared objective of modern-day museums. In some of the temples and monasteries there are inscriptions mentioning the names of the specimens, which may be compared to the labels used in museums. Immense previous ornaments and other valuable objects, like, sculptures, painted palm leaf, handmade paper, *bhujapatra* (*Betula utilis*) manuscripts, old apparels, metal and stone utensils, musical instruments, palanquin, chariot, arms and armouries, decorative arts are also in the temple possession. Preserved vast collection of the illustrated manuscripts of the temples are for the use of scholars. So, temples and monasteries are also the centres of learning.

Religious discourses, recitations of the *Ramayana* and the *Mahabharata* epics in which rural people gathered and participated, musical soiree, dance, drama, etc. are usual features of these temples and shrine complexes. They are accumulating and preserving treasures, antique objects, cultural properties of the ages for self-glorification and become important centres for public use. They purport to represent the national life. These are for education for inquisitive persons and for entertainment for all signifying the history and culture. In earlier days the temples were the centres of such activities for the whole of community, let that role now be played by the museums. Thus, a museum is a reflection of culture and social environment.

Museums collect objects, mostly damaged, sculptures in pieces, textiles eaten up by moths and worms, paintings flaked off and losing their colours, paper dilapidated and crumbled, then restored and preserved for posterity and exhibited. The objects are displayed in showcases using often least expensive hessian as their backgrounds. While collecting an object, for instance, if it is a sculpture, its name, provenance, material used, style, iconographical features, socio-religious context, etc. are to be recorded. These will help one to know about the item fully and its culture in oblivion, thus bridging us to distant past. These data cater to the needs and lost clamouring demands of the wider range of candid general public occasionally as well as scholar in particular. These do not show baffled reverence

for scholarship. Exposition is a way of making a didactic use of quite an extensive collection of museum objects for teaching new things to them. People make use of them as seeing is believing. The principal tool of a educational institution is the abstract words, whereas visual, tangible and concrete objects are the principal tools of a museum for serving the cause of education among people more effectively and make people museum mindedness. Museums offer an opportunity to satisfy their curiosity for knowing all factual information about any thing. For which detailed recording of objects is essential. Mere collection of object in isolation fails to satisfy all craving curiosities. So, need to collect formidable potential information therewith its cultural, natural contexts. It is now accepted that economic and even political factors cannot be divorced from the cultural context of any society. It is a holistic approach. Again, if a museum possesses in its collection art objects, paintings and sculptures of other countries of the world along with Indian such objects, these will reflect the commonness of human activities and fundamentally thinkingness of the human mind of different countries and activities. It will create also an ideology of *vasudhaiva kutumbakam*. This will harness the potential power of museums with their collections to establish a bridge bridging all together as a whole. Visitors are considered as *atithi deva bhava* i.e., guest is welcomed as god. A task of a museum is to give all of us, however, ill-educated or highly educated a clear sense of the past and a personal stake in the future by binding the present. Museums are institutions, which inspire and tranquil man with hope, even obviously in crisis and catastrophe in the conflict-torn world.

Art, archaeological, anthropological and historical museums preserve the cultural forms and practices of human.

Peasantry constitutes the main bulk of the entire population of India. They are living in substandard condition in villages sprawled out all over the country. Other problems, like, housing, health and hygiene, sanitation, dowry, social problem apart, mere education of such a huge mass is a baffling problem.

Industrial and technological museums have galleries on dam and electricity centres, steam engines, their uses, motor power locomotives, bicycles, enormous water resources, natural resources, mineral and the natural history museums deal with the preservation of biological resources, etc. and display these in *murda* (dead) *ajabghar* (wonderful house) or *murda chiryakhana* (dead zoogarden). It is so named for the reason that mostly skeleton of dead animals of the past and started birds, reptiles are preserved for the common masses. In villages these things with description in simple language can be displayed even in the panchayat ghar in glass almirahs to appreciate the nature and trying to re-do it. The noted museums are the Allahabad Museum, Motilal Nehru Park (previous name Alfred Park), Uttar Pradesh, the Municipal Corporation Museum, Jamna Bagh, Moti Mahal, Gwalior, Madhya Pradesh, the Municipal Museum, Kolkata run by the Kolkata

Municipal Corporation and the health and hygiene museums, e.g., the Health Museum, Public Gardens, Hyderabad, Andhra Pradesh, the Health Museum, Sayagi Bag, Vadodara, Gujarat, which cater information to the public about indigenous products, arms and armories, crockeries, old coins, street-stalls, street noises, public toilet and civic health knowledge, cleaning roads, drains, garbage and sewage dispose, unhygienic, uncleanliness activities, use of vaccination, preventive methods against different contagious and water-borne diseases through scaled down or scaled up models, panels, 3D mock-up, dioramas, charts, diagrams and photographs. So, museums may take a pioneering attitude to preserve diverse topics and to mingle these together harmoniously aiming to provide a viable means to gauge in proper perspective the impacts of various types of museums. All types of museums have a deep bearing on their activities to serve the people at large. Museums are mirror of heritage of humanity and significant cultural plurality of the Indian societies. India being one of the hotspot of the cultural diversity of her multi-cultural societies of diverse people to foster interculturality in order to develop cultural interaction in the spirit of binding bridges among people. For portraying the heritages, the Indian museums have great responsibilities in fulfilling the objective of social accountability, especially in the areas of education and raising public awareness of its true value and their signification to safeguard the cultural objects for the use of future generations to come. Cultural plurality makes the task more daunting of course. Yet, Indian museums are the ideal launching pads for creating an ambience with their potential tools whatever at their disposal for education. And museums can do it best. They also adopt contemporary problems and the changing needs of the society. The pedagogic role of museums to society is universally recognized and opens up several key issues of inter and cross studies and multi-disciplinary researches and museums are urging on these. This would be a key vehicle for catering broad-based education for all, irrespective of rural and urban, rich and poor, educated and uneducated. Museums are basically aiming at about this vital role of education and they do have greater role to complement, to revitalize, wherever and wherefore needed and in filling up the lacunae this storyline. These museums show film on awestruck diseases and how to eradicate citizens dazed ignorance, prognoses about these. So much else could also be separated out. Such museum could go on for municipal all citizens facilities for ever. Thus, they become vibrant organs for reshaping of knowledge of the society. The museums will not be confined only for collecting, preserving and exhibiting all mysterious objects, but making them as living organs of the society and try to solve the problems. Museums are to be people-minded and people's institutions. Museums have to be very effective in contributing to people's education and are best for breaking the barriers to impart education with their original contents. They can open a new vista before us. Education is the primary goal of all formal educational institutions, but in case of

museums the medium of education is different, here the medium is the objects, which imbued visitors to education. Museum objects inculcate education faculty in the visitors minds. The museums are called as the temples of muses.

Usefulness of herbal medicinal plants with their local names, diseases to which these are used, methods of drug preparation, doses, diagnosis, symptoms, cause of disease, the side-effects may be embodied to cultivate these medicinal plants for the benefit for the society. Ayurvedic medicines have no side-effect. This is a less expensive age-old traditional knowledge of the villagers. Since independence the government and a handful of private bodies have been initiating rural welfare schemes, aiming at socio-economic and cultural upliftment of the rural people. The science and technological museums go a long way in taking various programmes benefiting the society and they are pioneer to create a science temper among the rural inhabitants. Education plays a useful and significant role in such schemes.

Indian economic structure is mainly based on agriculture. Indians still pursue cultivation in traditional methods. They have little idea about the improved agricultural methods, which are followed at present in other advanced countries. Agriculture being the mainstay, so museum exhibitions on agriculture showing all details of scientific agricultural equipments, friend-and foe-birds of crops will be more useful. Harmful and useful pests and insects of cultivation should be shown through colourful pictographs, like, charts, drawings, diagrams, sketches, cartographs, photographs and models. Such selected visual aids form the core of an exhibition to arrest the attention of visitors. The proverb 'Seeing is believing' is very true especially in case of the unlettered, unsophisticated and uncomprehending villagers. The visual aids put life to them and the museum personnel may present them in simple and local idiom. Such illustrations will accentuate peasant's interest. Museum laboratory may analyse the soil, water and suggest their suitability to cultivation. Discussion on the usefulness of soil items may be broadcasted through radio-talks particularly in majdoor mandali asar or krishi darsan or gram diganta. Food processing and traditional storing systems of food stuffs in hygienic ways may be shown to sensitize the villagers. Affect of drinking of pond's dirty water, living in unhygienic befool uncleaned clothing, better housing, land- erosion, health and sanitary principles, adulterated milk should be highlighted to aware about the bad effect of these to the sordid village masses. Use of lacto-meter for ascertaining pureness of milk is hitherto enormously helpful to eradicate vaguely realized concepts. It is admittedly true that the ordinary people are indifferent for not aware about these.

In the context of apathy and indifference, museums can assume a meaningful role. They can combine instruction with entertainment in such a way that cut across the barriers of illiteracy and inspire the various cross-sections of the society to take the services of museums for the benefit of the society. Cutting down of trees of the forest entailing deforestation and consequently soil erosion, plantation to conserve

the soil may be shown to the public through museum exhibitions. Villagers now as a means to drive away the wild elephants for protecting their crops, vegetables in the fields, domestic cows, goats, buffalos, tigers are killed by mixing even poisonous insecticides with mudi (popped rice), edible meat or with other food stuffs, like, rice, sugar-cane, potato, tomato, etc. as in Kaziranga, Sibsagar in Assam, Sundarbans in South 24 Parganas, West Bengal.

Aforestation and indiscriminate, killing of birds and animals destroy their interactions and environmental balance. Global warming causes melting of ice, sea-level rises high and flooded the low lying areas, like, the Sundarbans, southern part of Bangladesh, etc. *Dhangakar* (*Dhanga* = steep hill, *kar* = castle) in the frontier of India, Tibet steep range of *terai* traditional house type of Leh, once capital of Ladakh is disappearing health hazards for air pollution, caused by huge gathering of people in meetings, book-fair and how to combat the pollution, traditional arts and crafts, how to boost up them, their markets, profit, middle-men sucking the maximum profit, working forces labour problems in factories, etc. may be shown through museums as instrument of public education. For that museums can take the help of print media, like, their publications, news papers, radio, television mass media, compact disk (C.D.), film and these perform the social accountability of museums. To cure the patient of snake-bite poison *ojha* (witch doctor) tied magial puffed thread just above the bite spot, chants *mantras* (incantations) and even administered harbal drugs. In poisonous snake-bite death is inevitable. So in serious cases, like, snake-bite tribal people may be aware about the danger to follow occultism and inspired them to go to hospital for allopathic treatment with anti-venom injection. Dowry system nowadays becomes a social disease, even Parliamentary banning wives are tortured by their husbands, in many cases such wives committed suicide for severe mental agony. Special economic zone (S.E.Z.) methods to acquire land for the benefits out of S.E.Z., etc. may be highlighted through drawings and abstract models in museum display. Social problems, process of such problems, irradiation, ethnic conflict and overall developments of scheduled tribes, scheduled castes, other backward communities and minorities get added value in the field of responsibility of museums to society. Many other social problems were depicted in terracotta plaques found in temples, carved in wooden panels of the *raths* (chariots). There are various agencies, like, light, heat, humidity, pollutants, micro-organisms, which have deteriorating effects on heritage materials. Of these biological agencies, like, micro-organisms and insects, like, silver fish, termite, beetle, book-lice, cricket cockroach, cloth moth are the most devastating agents. Almost all classes of heritage objects, such as cellulosic proteinaceous objects, paintings are damaged by these agencies. Among them organic materials, such as textiles,

paper, fibrous materials are affected beyond restoration at times by the biological agents. Cause of biodeterioration and remedial measures to control of bacterial and fungal growth on heritage objects may be communicated through simple methods of display people. So, in museum people perceive, receive and respond to information and can reconsider and revitalize their conventional wisdom through museum various expositions. The expositions offer opportunity to widen their perceptions and to enrich their knowledge.

These types of proactive and pragmatic fundamental education, which aims to help the villagers to understand the basic needs of problems of their immediate environment and to participate more effectively in all local implications, followed by consistent organizational activities and suitable modifications in framing up schemes, which are all that are necessary. As life becomes more complex and complicated, so the impact of the museum tends to be more and more useful and welcome in a society, which is becoming ever more keen in order to visualize life and environment around. It is becoming social centre, where people assemble on their own and the exhibits serve as the link in order to bind the visitors with a cord of realization. Museums are gaining ever increasing recognition as an element of culture in the growing society and are vying with one another for achievement. Museums operate as the home par excellence of popular nonformal education of the common people to the utility of museum services in community life. The museums collect the antiquity and preserve the cultural heritage for the future generations to come and chemically conserve the damaged worm infested objects. In pursuance of such activities museums can best be utilized in serving the community by organizing indoor and outdoor periodical exhibitions. Museums send mobile exhibitions to *melas* (fairs), cultural centres, schools and colleges. situated even in rural areas, from where people have no or less opportunity to visit museums in towns and cities for distance and financial constrain to foster education. In such ways also museums help to reconstruct our past history and culture.

But the heterogeneous composition of the Indian community has many demands and needs. No single museum can able to meet all the demands of these various strata of the community. So, the particular needs of the people of the area where the museums are situated and the museum personnel will be able to marshal facts and offer interpretations consistent with the requirements at the right time in a right way.

It is stressed that the museums stand at the forefront of all other educational institutions, which satisfy the needs of all. Museums do not limit their court of exchequer of public money. So, museums should take a lead as corpora in the field of social accountability.

Museums serve both the elitist and populace masses. Following the ICOM

Statues (Article 2 Para I) museums should be engaged "in the service of the society and its development." The concept of neo-museology has grown up where the populace is the true owner of the museum, but not its governing body. The museums are now trying to involve people in planning and running it. With the radical change of concept zoological gardens, botanical garden, aquariums, planetariums are now included in the domain of the museum, which is a result of social mobility that made museums to include in their ambit not only inanimate but also animate objects.

In this context museums are providing opportunities for community involvement in their work through friends' group, volunteers and in order ways. They acquire different types of objects related to culture through loan, gift, purchase, bequest, exchange, exploration and excavation, which are conserved by chemical conservation, kept in storage and displayed in galleries to communicate knowledge, ideas, even these are done by different programmes, mass media and publications and docent service.

Nowadays, every museum has adopted an educational policy to enhance the education of all through its collections. Sometimes museums also conduct some outreach programmes for the people, who are not able to visit museums for economic hardship, distance and lack of proper knowledge. Museums often arrange seminars, work-shops, hands-on-experiments, quiz contests for promotion of knowledge through excitement and motivation to students and guardians. Sometimes they also undertake literary programmes for the street children, child labourers and prisoners and kits to schools for education. They also arrange vocational training, career counselling, etc. From social and cultural benefit the museums ensure the preservation and conservation of the communities' cultural and natural heritage. It gives support to educational institutions. Social accountability of the museums brings up the question of economic benefit that the museum can provide to the people. Quite obviously, a museum needs to engage a fairly large number of staff for its smooth functioning through its extended services in tourism, to artisans, ecological and environmental interpretators.

Publicity and marketing are two words recently very related to museums for their identity and to satisfy the visitors through their products. Some museums organize a market complex with shops for selling books, pamphlets, photographs, models, mementos, slides and also have restaurants, hotels even for visitors. Even cultural infrastructure also grows around some museums with theatres, cinema, concert hall, show *pat chitras* and provide also support for attracting investment from private organizations or even from the government and have bank and hospital. Virtual museum is nowadays developed for socializing and globalizing museum activities. It is, in reality, a storehouse of computerized pictures and information related to museums stored in internet through which a person become acquainted with treasures accumulated in different museums by sitting anywhere of the world and thus since has made the world a global village.

Though museums has responsibility in social accountability, but above all of these, we have to be involved to conserve our unique national and cultural heritage to feel ourselves proud for out nation and make our nation proud in the world. The museum authorities have become more conscious about museums. Accountability is the result of the responsibility, which is the process of museum. Biographical/ personalia/family/period museum has immense responsibility to cater knowledge to its visitors. Every museum has its own message. The Rabindra Bharati Museum, Kolkata will convey Bengal renaissance galaxies by displaying objects of the Tagore family and inspire youths in observing spring festival, which is a jubilate and source of power, while the Gandhi Memorial museums, the social developments. Museums are run by government and private funds. So, they have to bridge the people.

John Cotton Dana said, "The museum can help people only if they use it; they will use it only they know about it and only if attention is given interpretation of its possessions in terms they, the people, will understand." (Alexander, E : 1983 : 145) Good museums attract, entertain and arouse curiosity, which leads to questioning and thus promotes learning. The real challenge to museum is to have a broad view of issues and activities of the museum and makes those issues available to the visitors. To achieve this end to ongoing responsibility of museums is the outreach programmes. Museums provide greater services to people and these are the effective means of communication. Exhibition equation is presentation (physical display) + interpretation (explanation and exposition) = communication (the exhibitor's goal). The museum shall use its collections and resources to inform and inspire the general public by exhibiting important works of artistic beauty and excellent craftsmanship produced by persons. The museums ascribes its role as a repository of the cultural heritage of the region and is dedicated to serving the people of the area. Museum is the reflection of cultural and social environment. Museum staff require training and planning to develop and implement a meaningful outreach programme. Museums have yet to realize their full potential as institutions of informal learning well-trained staff can foster an image of what a museum is and can be. John Cotton Dana said again, "The museum should take every opportunity to develop its role as an educational resource used by all sections of the population or specialized groups that the museum is intended to serve. Where appropriate in relation to the museum's programme and responsibilities, specialist staff with training and skills in museum education are likely to be required for this purpose. The museum has an important duty to attract new and wider audiences within all levels of the community, locality or group that the museum aims to serve, and should offer both the general community and specific individuals and groups within it opportunities to become actively involved in the museum and to support its aims and policies." (Bloom, J. & E. Powell(eds.) : 1984 : 192). Forthright and sincere action makes the plan successful.

References

- Alexander, Edward, *Museum Masters*, Nashville, Tenn, American Association for State and Local History, 1983.
- Basu, Sankha and Mahua Chakraborti, *Museum Norms Terms - A Selective Approach*, Dey's Publishing, Calcutta - 700073, 1999.
- Bhowmick, Atul Chandra, *Museum and the Society*, Folklore, Vol. XIV, No, 10, British Indian Street, Calcutta - 1, 1973.
- Bloom, J. & E. Powell (eds.), *Museums for a New Century*, A report of The Commission on Museums for a New Century, Washington, DC., American Association of Museums, 1984.
- Coulsm, Jessic, *et al* (ed.), *Oxford Illustrated Dictionary*, Oxford University Press, Ely House, London W1, 1970.
- Daifuku, Hiroshi, *The Museum and the Visitor*, *Title Organization of Museums - Practical Advice*, Museums and Monuments IX, Unesco, Paris, 1960.
- Edison, Gary & David Dean, *The Handbook for Museums*, Routledge, London & New York, Published in association with Smithsonian Institute, 1994
- de Borhegyi, S.F., *The Museum as a Cultural Centre in the Development Of the Community*, Unesco, Paris, 1963.
- Encyclopaedia Britannica* Vol. 15, Encyclopaedia Britannica Inc., The University of Chicago, 1973.
- Gilmen, Benjamin Ives, *Museum Ideals of Purpose and Method*, Museum Of Fine Arts, Boston, 1923.
- Harrison, Molly, *Education Today Changing Museums*, Longmans, Green and Co. Ltd. London W1, 1967.
- Hudon, Kenneth, *Museums for the 1980s - a Survey of World Trends*, Unesco, Paris, 1977.
- Kennedy, H.A., *Local Museums - Notes on their Building and Conduct*, Title Oxford University Press, London, 1938.
- Markham, S.F. & H. Hargreaves, *The Museums of India* The Museums Association, Chaucer House, London, W.C.I. 1936.
- Roy, Sachin, *Problems and Prospects*, New Delhi, 1972.
- Seyffert, Oskar, *A Dictionary of Classical Antiquities*, George Allen and Unwin Ltd., London, 1957.
- Sivaramamurti, C. *Directory of Museums in India*, Ministry of Scientific Research and Cultural Affairs, New Delhi, 1959.
- Wittlin, Alma., *The Museum - Its History and its Tasks in Education*, Routledge and Kegan Paul Limited, London, 1949.

The case of fake relics

SUPRIYA MUNSHI

Working in a Personalia or Biographical Museum for around five (5) decades and building it almost from the scratch have caused many a headache to me and one amongst many till now is genuinity or authenticity of a Relic that comes for collection by a personalia or biographical museum. This, of course, is true for other museums who deal with archaeological antiquities or sculptures, even paintings, etc., till methods of dating were discovered. Still fakes are galore, whether due to infra-structural difficulties, lesser number of good laboratories or unscrupulousness Curators, etc. A Curator, of course, never wants to dupe his visitors, but this has come to stay. A few years back (3rd January, 2010) the Gandhi Museum, Barrackpore, Kolkata, received a gift of a big and heavy wooden Charka or Spinning Wheel that was used by Mahatma Gandhi in the year 1938 in Kolkata as informed by the Donor. After enquiries, however, no definite information about the authenticity of the Charka could be obtained. Gandhi Museum, still put this on display with the information as provided by the Donor, but has written on the label - 'supposed to have been used by Mahatma Gandhi', to avoid any confusion or apprehension.

Relics are articles or personalias or memorabilias associated with a great Personality who is commemorated through a personalia or biographical museum and these could be locks of hair (of Gurudev Rabindranath Tagore), teeth (of Mahatma Gandhi), dresses, used articles, furniture, writing materials, letters, manuscripts, books, to automobiles, etc. These are usually known as personalia or memorabilia and where greatmen were concerned the manufacture of fake relics has always been a profitable business. Experiences do hold that fakes greatly outnumber the genuine or authentic ones.

And, the most fake relics are to be found about the great British Admiral Nelson now in the National Maritime Museum, London. The great numbers of Nelson relics are really staggering. It is perhaps not an exaggeration to say that there are enough locks of his hair in existence that can thatch a small hut. We have again a great many number of Queen Elizabeth I's cots. To keep all the beds in which she was supposed to sleep, Elizabeth I would have spent every night like 'Iser rolling rapidly' from bed to bed in order that all the personalia beds might be properly authenticated.

So far Nelson relics are concerned we know very well from Sir Harris Nicholas how those were being deliberately manufactured in large quantity. Unhappily in so many cases the genuine is obliterated by the fakes. Undoubtedly some locks of hair of Nelson must have been genuine. Some could be true of materials used by

Nelson on board the *Victory*. However, if all the furniture and other impediments which he supposed to have on board the *Victory* at the time of his death were genuine he could have required a ship almost as big as the liner *Queen Elizabeth*.

So the first duty of a Curator of a personalia museum is to know thoroughly about an object before accepting this as donation or purchase and necessarily research about it before adding it to his collection. We can cite in this connection the Crimson Velvet gown embroidered with pearl-beads, belonging to one of the gentle women Attendant on Elizabeth I at the time of the Armada. Actually it was passed out as a costume belonging to the Queen herself who wore it during the thanks-giving ceremony at St. Paul's after the defeat of the Armada. The truth could only be ascertained after a thorough, patient investigation.

Experience again speaks that fakes would be of many kinds in proportion to one genuine. The first one such fake is which is deliberately manufactured. For instance there are two examples of the Telescope which Nelson is supposed to have put to his blind eye at Copenhagen. One is in the National Maritime Museum, London and the other in another museum, but both are so big that these cannot be used by a one-armed man, and we all know that Nelson was one-armed person. Even the legend which the faker has put upon the instrument now in the other museum contains interesting information which came into being after Nelson's demise.

In the same museum are fourteen (14) swords reputed to have belonged or associated with the great Admiral and his Campaign of which only one is found to be genuine. It is, in fact, the sword he had made shorter than usual after losing his right arm. His Dress-Sword, on the other hand, was actually made by Messrs. Wilkinson, who are able to provide the name of the actual Admiral to whom they supplied it in 1856.

The next case of bogus relic is 'Wrongman' relics. These are cases of perhaps innocently mistaken identity. For example a portrait reputed to represent Capt. Masterman Handy, Nelson's Flag Captain, was few years ago considered by the National Maritime Museum, and it was then quite clear that it did not represent the Flag Captain. Actually there were three (3) Captains Handy and so the portrait became problematic.

Third class of fake-relic is the traditional relic. As example the Saw exhibited in Royal United Service Institution was said to have been used by the Surgeon who amputated Nelson's right arm. According to family - tradition, it belonged to the Royal Navy Surgeon who came of this family and who amputated Nelson's Arms. Actually the Saw belonged to the same man, but he did not ampute Nelson's arm.

Sometimes, however, the evidence points the other way. A dress, said to have belonged to Marie Antoinette, turned to belong to more than half a century later when properly examined. Actually, as found out, a family member wore it in the

character of Marie Antoinette in a fancy dress ball, and family hearsay had done the rest.

The last class of bogus relics, according to Mr. Carr, Director of National Maritime Museum supposedly in the sixties of the last century, who worked on them earlier, were 'snowball' relics. These would be which somebody starts off with a wrong description to which something is added with each transfer of curatorship until an almost unassailable weight of tradition had been accumulated. An example about such relic occurred when an American Museum purchased a Settee from Nelson's cabin in the Victory. After a search it was found that the dealer, from whom the museum bought it, purchased a pair of such Settees many years ago at a Sala in Scotland when informed that these had come from a house where an Admiral had lived. Naturally with time this Settee may assume an unassailable authenticity.

What all these boil down is that only proven relic should be accepted by a museum and put on display. In the early nineties an Artist with much enthusiasm presented a cement - bust of Mahatma Gandhi to the Gandhi Museum, Barrackpore. It resembles more of Lord Pethic Lawrence than Gandhiji. Knowing well that if refused to accept it would affect the emotion of the Artist, I accepted it and has placed this in a corner of the museum's front garden instead of in any gallery. This, of course, is not an example of fake-relic, but it has a different dimension.

Preventing Bio-deterioration of Tangible Heritage in Museum Collections

SYED ASIF AKHTAR NAQVI

Before we look into the issues of museums fundamental responsibility of safeguarding the collections in their custody and the significance of environmental control in museums to prevent the bio-deterioration of their possessions it seems important to define first **Museum, Tangible heritage** and **Bio-deterioration**.

According to the ICOM Statutes, adopted during the 21st General Conference in Vienna, Austria in 2007 :

A **museum** is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.

H.J. Hueck (1965-68) defined bio-deterioration as, "any undesirable change in the properties of material caused by the vital activities of organisms"

A **tangible heritage** is one that can be stored and physically touched. This includes items produced by the cultural group, such as traditional clothing, utensils (beadwork, water vessels) or vehicles (ox wagon). Tangible heritages include great monuments, such as temples, pyramids and public monuments. Though a tangible heritage can perish, it is generally more obvious how it can be conserved. But the tangible heritages are at greater risk and can be lost for all time to come.

Now let us focus our attention to the question of role and responsibility of museums to keep the valuable material or tangible collections in their custody in safe environment specially to prevent their bio-deterioration, because often tangible collections in museums are even more endangered while kept under adverse environmental conditions that invite bio-deterioration, typically in hot and humid surroundings.

Vanphang Keopanna in her Master's Thesis, '**Museum Collections and Bio-deterioration in Laos**' states,

"Museums in Laos preserve cultural materials of the past for future generations. However, the fertility and the high temperature and humidity of the tropical climate brings on bio-deterioration. These conditions combined with urban pollution, bad building maintenance and low budgets make long-term preservation of collections very difficult for museum professionals. Mould and insect pests are a major problem for museum problem for museums, even with repeated treatments for insect infestation. Because appropriate and safe environments are not provided for

collection, storage and display, the mould and insect problems reoccur. Therefore, plans for prevention and control of bio-deterioration that are appropriate for the conditions in Laos are critically important for museum personnel (Daniel : 2003 : 76)."

It is therefore very important for museum professionals to understand that one of their primary duties is to keep their collections in safe environment, protect them from agents of bio-deterioration, to know the environmental conditions and their effect on bio-deterioration and finally to take appropriate measures for prevention and control of bio-deterioration.

Environmental Conditions and their Effect on Bio-deterioration

For inorganic material, like stone, glass and ceramics, high levels of light are normally not a problem, but organics require lower light levels and survive best in dark storage. Dust and other airborne pollutants can adhere to collection objects and, because they are acidic, damage them chemically. Fine dust can become so deeply embedded in pores and cracks that it cannot be removed, making museum objects look dull and neglected. Embedded dust is an even more serious problem because dust tends to absorb water vapour resulting expansion of the volume of the dust and places pressure on the sides of the pore or crack, sometimes causing damage.

Altogether, environmental factors contribute critically to the degradation of museum collections. The examinations of all environmental factors is outside the purpose of this thesis. So this discussion will focus on heat and humidity, since they provide an environment that encourages biological pests to thrive and reproduce.

Heat

Heat is measured in temperature on the centigrade or fahrenheit scales. In museums, the heat is measured that from the infrared radiation of the sun or artificial lighting. When heat increases, the movement of molecules also increases, so chemical reactions happen faster, solids become softer, and liquids evaporate. For museum objects, increased heat makes materials age faster and dry out (Florian : 1997 : 6). A cool temperature, on the other hand, slows down ageing and makes materials absorb moisture. Cold has no direct adverse effect on objects, which tend to survive better in colder environments (Corr : 200 : 23), so lower temperatures for museum objects are preferred (Staniforth : 1984 : 194).

Higher temperatures are especially damaging to museum collection materials such as acidic paper, acetate and nitrate films, celluloid, rubber, and objects, which contain waxes or resins, as in ethnographic collections. Yet probably most significant influence of temperature is its relationship with R.H. for temperature determines the amount of moisture that the air can hold, and this amount is used to calculate R.H.

Relative Humidity (R.H.)

All materials that contain water react to the amount of water that is present in the air surrounding them. In dry air they release water into the air, and in the damp air they absorb water from the air. Warm air can hold more water than cool air, and R.H. is measured as the percent of water vapour in a given volume of air relative to its maximum holding capacity (Staniforth : 1984 : 195). Air temperature influences the water-holding capacity of the air, because increased temperature makes air molecules more energetic and active more capable of attracting molecules of water vapour and mixing with them. Therefore, air at higher temperature can hold more water (Florian : 1997 : 6). As temperatures rise, the same amount of water, in grams, represents a smaller and smaller percent of the total amount of water vapour that the air can hold. For example, for a cubic metre of air with 8.5g of water.

At 15°C. the R.H. is 68%;

At 20°C. the R.H. is 50%;

At 25°C. the R.H. is 37% (Florian : 1997 : 7)

When temperature goes up and R.H. goes down, the air is "drier" and will have to equalize its R.H. with that contained in objects. Water will be released from objects into the air, so that the R.H. of the air and the water eventually become the same (Florian : 1997 : 7). Different materials require different R.H. levels for preservation. Metals normally survive best in a drier environment, so that the chemical conditions for corrosion are limited. Organics, however, contained a great deal of water when they were living materials, so it is not surprising that organic artifacts require greater moisture, a higher R.H. to ensure that they are less likely to dry out, crack or break.

Effects of Temperature and Relative Humidity on Bio-deterioration

High temperature can increase biological activity, for most moulds thrive and reproduce more readily in warmer conditions. The general rule for fungi and insects is that growth occurs from about 5°C. or 10°C to about 37°C, with slow growth between 15°C. and 20°C. and rapid breeding at 25°C.-30°C. Above 40°C. insects become distressed, and above 55°C, most insects will die within an hour (HCCGECCT : 2001 : 14, Pinniger 1989). In other words, temperatures over 25°C. best promote the breeding of insects and moulds and therefore promote bio-deterioration.

R.H. is also a key environmental factor in bio-deterioration because the more moisture in the environment R.H. affects of the growth of micro-organisms; for example, "some pupal cocoons can absorb moisture from the air which will initiate adult emergence and the conidia of fungi may need fluctuations of temperature and moisture before they can germinate" (Florian : 1997 : 7). Moreover, damp conditions promote not only the growth of moulds and other fungi, but also the

breeding and activity of insects, such as silverfish, which are most active when R.H. exceeds 70%, but would not be a problem at low humidity (Thomson : 1999 : 66, 86). Moisture in artifact materials affects bio-deterioration because damp objects provide the habitat that micro-organisms and insects need to survive, and moisture can also break down some materials and make them more digestible and attractive to bio-deteriogens, for which wet wood encourages infestation by termites and borers by powder post beetles.

In conclusion, it is clear that a high temperature, high R.H. are the most damaging one for the museum collections.

Ideal environmental conditions for storage and display	Storage	Display
Temperature	18°C.-22°C.	18°C.-22°C.
Relative humidity	45%-55%	45%-55%

Dr. S.M Nair has also discussed the problems of bio-deterioration of museum materials, with particular reference to those in tropical countries, based on studies recently conducted in India and information already available. Symptoms of bio-deterioration, damage caused by insects, damage due to cryptogamic plant growth, the prevention and control of bio-deterioration, preventive measures, chemical treatment given to objects, use of chemicals within display and storage units, control measures and biocides for the eradication of insects are described. Periodic checking of the collections to detect biological attack is very necessary. Knowledge of the life processes and characteristics of the various agencies of bio-deterioration forms the basic foundation on which systematic and intelligent control measures.

In conclusion we can say that the basic curatorial responsibility of a museologist is to safeguard, protect, prevent its collections of tangible material heritages from agents of all the damaging factors. specially the biodegrading agents. The foremost step in this direction is to regularly monitoring the museum environment and appropriate measures to control it. There is also a dire need for a collective collaborative research program for preventive and curative conservation of tangible moveable heritage research in museums to undertake museology departments and conservation institutes.

Reference

- Allsopp, dennis, et al, *Introduction to Biodeterioration*, Cambridge University Press, 2004.
 Keopannha, V., (Master's Thesis) *Museum Collections and Biodeterioration in Laus*, Gothenburg University, 2008.
 Nair, S.M., *Biodeterioration of Museum Material*, Agam Kala Prakashan, 2011.

Demonstration: A time proven technique of Interpreting History

SUNJAY JAIN AND KANIKA B. MONDAL

'History is boring!' or 'What is the use of learning history?' are the comments that we get frequently when we talk of history. This downbeat public perception is due to the didactic approach to teaching of history with inordinate focus on dates, names and wars in our school education. Museums also take didactic approach to present history further reinforcing the negative attitudes towards history. Whatever is the reason; the discipline of history could not grow in stature and has always been held in low esteem by public.

This article is written in the conviction that public perception is a fragile entity and that positive perceptions develop with positive, satisfying and self-fulfilling experiences in life. And the fundamental assumption is that if people feel history is boring it does not mean that they do not enjoy looking at things which are presented to them in museums. It is surprising to see the number of people who visit past. Interestingly, though they may not be aware of the history and background of the historic place, most of them are happy viewing it. The potential of the past needs to be exploited beyond just viewing or visiting it. People need to learn history and historical processes which calls for use of interpretive methods by our museums and historic places. This article focuses on demonstration as one of the effective methods of interpreting history and explores its potential use in museums.

Since the beginning of 20th century, museums have been trying to be public oriented in their approach and have been exploring new ways of serving the society. They have used activities such as dramas, concerts and cultural performances and festivals to make museum visiting enjoyable and memorable experience. Demonstration is one such popular method that has been used by museums for the last hundred years or so. In 1910 in England, an official "guide demonstrator" was appointed at the British Museum (Gilman, 1984). In 1920's Norwich Education Committee appointed H. J. Howard, as 'museum demonstrator' to teach at the Castle Museum (Greenhill, 1991). In 1967 Molly Harrison, Curator, Geffrye Museum, London emphasized the use of demonstration as a powerful method of education in museums. On the basis of her experience she wrote that: "To most people demonstrations are far more attractive than talks and those museums, which have provided series of craft demonstrations for the public have usually had an enthusiastic response. Everybody likes watching other people doing things, and when the 'doing' is perhaps a comparatively simple process, which was once current

but is now little used; it is all the more revealing." She further observed that: "When we watch somebody making things our fingers often itch and we want to try ourselves, so demonstrations can lead to audience participation of one kind or another." (Harrison 1967: 77)

Demonstration is regarded as a highly effective method of education as it makes learning engaging, intelligible and clear. In museums, activities such as making of various arts and crafts and cooking of traditional foods; and use of musical instruments, equipments and objects of day to day life are explained well through demonstration. Science museums are employing this method to demonstrate basic principles and phenomena of science and their application. They organize science demonstrations for school children based on school curriculum such as properties of liquids; principles of heat; elements, compounds and mixtures etc. They also conduct demonstrations for common people to dispel obscurantism, superstitions and to inculcate scientific temperament and attitude.

Demonstration is a method by which an educator with the help of various tools and equipments practically shows how to make, do or use certain things. It should not be confused with experiments. Kumar and Hansra (2000) have made an important distinction between the two. According to them, demonstration is showing proven techniques to reveal the procedure of doing whereas experiments are trying new ideas under artificial conditions. This is an important distinction which clearly explains the difference between demonstration and experiments.

Demonstration can be classified in two broad categories: personal demonstration and non-personal demonstration.

Personal Demonstration: Personal demonstration is one in which the demonstrator is present in person to practically show and explain the process himself. It is a live performance where there is ample scope for direct interaction with the demonstrator. The viewers are free to ask questions and clarify doubts. Personal demonstration can again be subdivided into two types. One, demonstrations offers opportunities for the viewers to repeat the activity. Here demonstration is accompanied with 'hands on' learning experience. The participants learn by way of imitation which enhances the impact of learning and offers scope for correcting misconceptions. Two, the demonstration is a simple process depiction with no 'hands on' learning experience. Here only the demonstrator is physically active and the audience passively views the performance and simply interacts with the demonstrator.

Non- personal Demonstration: In this the demonstrator is not present in person to perform the activity. An effort to educate is by way of recorded programs in the form of films or videos. Here the audience can only see the process but cannot interact with the demonstrator. However there are several advantages of non-personal demonstration. One, museums particularly in India do not have many

educators who can demonstrate frequently and repeatedly. Two, the cost of hiring the demonstrators can be saved upon. Three, preparation of films involves one-time-expenditure. Once ready, multiple copies can be generated; repetitions can be done and also played at multiple locations at the same time.

What makes demonstration a popular method is that it works for people of all age groups and in all the domains of learning – cognitive, affective and motor. Grater (1976) enumerates its benefits as under:

- It offers the visitor an opportunity to see one or more phases of the story as well as hear about it.
- It encourages questions.
- It holds visitor attention. Seldom does one find the visitor indifferent to a good demonstration.
- It can show the involved story when the oral description would be inadequate.
- It shows clearly how something is done.
- It shows clearly how something works.

A demonstration offers a multisensory experience. People can hear, see and experience something happening in reality. Some demonstrations can involve other senses also. For example, a cooking demonstration can evoke the smell and taste buds too. In essence, a demonstration stimulates interest, makes people relate and connect personally to the information presented and help them retain learning. It is a well-known fact that people tend to remember more when they see and do things than just by reading or listening.

The method of demonstration is being used by some of our museums. For example, Indian Handicrafts and Handlooms Museum, Delhi invites craft-persons from various parts of India on regular basis who demonstrate their crafts such as block-printing, weaving, pottery, terracotta, bronze casting, embroidery, and Madhubani painting. Indira Gandhi Rashtriya Manav Sangrahalaya, Bhopal also organizes such demonstrations. Chatrapati Shivaji Maharaj Vastu Sangrahalaya, Mumbai uses demonstrations periodically to show certain processes such as making of Pahari Miniature Paintings and art of Origami. But most of these museums are showing living traditions only. Demonstration has a lot of potential to show techniques used in the past and also explain cultural objects and symbolism. For instance, making of stone tools and their uses; different types of pottery making; making of seals and sealings; casting, punching and stamping of coins; techniques of bronze casting such as *Cire perdue*; playing of ancient games and musical instruments and so on. Various styles of writing can also be explained like use of stylus to write on palm leaf manuscripts and writing of ancient scripts like *Brahmi*

and other regional scripts. Another very important demonstration could be of historical battles. Large size battle scenes could be created showing geographical terrain with position of armies and small scale figures of soldiers. The strategies used by different commanders of the armies can also be explained using such model.



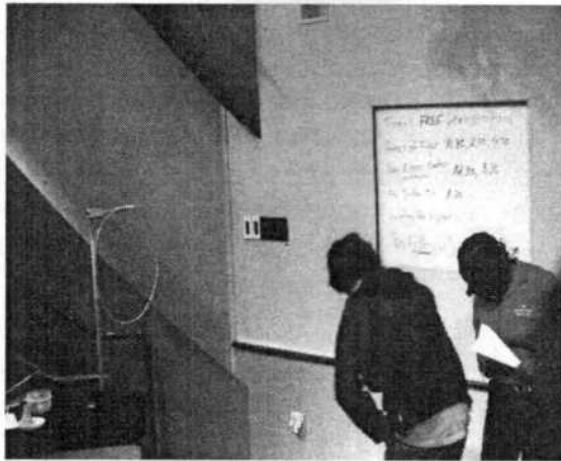
An educator in period costumes demonstrating the process of embroidery.



An archaeologist showing the process of flint tool making.



*An artist showing the process of making Pahari Miniature Paintings.
CSMVS, Mumbai.*



*Demonstration area in the exhibition gallery of Air and Space Museum, Smithsonian
Institute, Washington D.C.*

Organizing a demonstration involves a lot of planning from conception to execution. The answers to the following questions can help in anticipating the learning outcomes, resource requirements and help in eliminating problems at the time of execution. For conducting a successful demonstration following questions need to be answered:

What is to be demonstrated? This refers to the process that we intend to show and explain. That means choosing a topic that is related to the subject areas covered by the museum and is of interest to the museum visitors.

Why we are demonstrating? Answer to this question will define the purpose of demonstration.

Who shall do the activity? This refers to the person who will be responsible for doing the activity.

When and where the demonstration is going to take place? That means deciding the venue and timings of the activity.

How are we going to demonstrate? This implies collecting and arranging information about the process to be shown, tools, equipments, personnel and methods which would be used.

Answers to the above questions provide basic information about the activity to be conducted. However it poses several challenges. Foremost is authentic information about the themes to be demonstrated and availability of tools and equipments. This demands serious research and efforts on the part of the museum. In many cases original tools and equipments may not be available and museum shall have to fabricate them. Another important consideration is that educational activities such as demonstrations, drama and cultural performances need to be considered at the initial stage of planning a museum or an exhibition. These activities are resource-intensive and need various resources including space. And space is such a resource that if provision for it is not made at the time of conception, it may become difficult to get suitable place for conducting the activity later. However museums should not be discouraged by these and look forward to its dual advantage. One, it can enhance the activity quotient of the museum, serving as a draw for visitors. And two, dispel the myth that history is boring by offering enjoyment filled learning experience.

References

- Colsell, Lesley. 1993. 'Demonstration — Ethics and Techniques' in *Social History In Museums: A Handbook for Professionals*. David Fleming, Crispin Paine and John G. Rhodes (ed). London: HMSO.
- Gilman, Benjamin Ives. 1984. 'The Museum Docent' in *Museum Education Anthology 1973-1983*. Susan K. Nicholas, Mary Alexandra and Ken Yellis (ed). Washington D.C.: Museum Education Roundtable.
- Greenhill, Eileen Hooper. 1991. *Museum and Gallery Education*, London: Leicester University Press.
- Grater, Russell K. 1976. *The Interpreters Handbook— Methods, Skills and Techniques*. U.S.A.: Southwest Parks and Monuments Association.
- Harrison, Molly. 1967. *Changing Museums Their Use and Misuse*. London: Longmans.
- Kumar, Birendra & B.S. Hansra. 2000. *Extension Education for Human Resource Development*. New Delhi: Concept Publishing Company.

To Build up a museum management information system: knowledge management approach

ARINDAM BANIK

I. Introduction

Museums as cultural organizations generate and hold vast amounts of information. This falls into three types of categories: *collections*, *museological* and *business* information. Collections information refers to all of the documentation about museum objects. Examples include accession, catalogue, donor records and image files. Museological information concerns the documentation about the activities that have some relationship to the objects such as conservation, exhibition, scholarly research and education materials. Finally, business information is all of the documentation about the institution housing the object and its administration, including financial and human resource records, names and addresses of donors, members, consultants and the museum's communications with all these entities.

In most museums these records and documents are viewed as a discrete set of material stored in separate 'containers' including databases, web sites, reports, libraries and archives, usually controlled and maintained by those who created them.

Commercial museum software applications (referred to as collections management systems), focus on collections information. As such they provide the means for documenting, indexing, retrieving and displaying data about museum objects. Less attention is paid in the need for managing museological information, or in the need to record and trace business information about museum public events and programs, or statistical information such as audience research, in relation to objects of the museum collections.

Museum web sites on the other hand, are often built from a "web emergency" perspective with the short-term goal of responding to an outside demand for putting content on the web. These efforts focus on external information provision rather than internal information management. As a result, many resources go into generating information, but no policies exist for retaining and re-using it. There is an increased awareness among museum information management professionals about the need to create, deliver and store museum information on an institutional rather than departmental or even individual level. In this sense, the fragmented view of information scattered throughout the museum will give its place to *knowledge* gained from navigating the information.

Current approaches to Museum Information Systems development have focused mainly, on technical issues for integrated access to different categories of museum information (e.g., MDA's international museum standard for describing objects called "SPECTRUM", and CIMI's Museum Initiative for Digital Information Interchange Standards project). They focus on the form of the product (collections metadata standards, digitization standards for digitizing visual or audio material, etc.), rather than on analysis and design issues. Consequently, true understanding of the information development process is still missing.

This paper advocates an enterprise knowledge management approach towards the development of museum information systems. Enterprise knowledge management refers to the collection of *conceptual tools and techniques* that enable the communication and sharing of enterprise knowledge between different people. We argue that such an approach can lead to a closer alignment between the organizational and informational aspects of a museum. By bridging these two domains, one can begin to incorporate case study.

II. KNOWLEDGE MANAGEMENT

Knowledge management is more about enabling than managing [8]. Its main objective is the communication and sharing of enterprise knowledge between different people. An issue of concern therefore, is how to describe enterprise knowledge so that this sharing can be effective. In practice, this question has been answered in terms of two possible alternatives: using *natural language* (for example consultants' reports) or using *conceptual modelling*.

The advantages of conceptual modelling over informal, natural language descriptions are well-documented. The goal in developing conceptual models is to gain insights into the problem and through this to arrive at an agreed set of requirements. This needs to be achieved in the context of an organizational setting that has the usual facets of time constraints, interpersonal conflicts, organizational politics, and ambiguities about goals and requirements.

Within the context of conceptual modelling, the term '*enterprise knowledge modeling*' refers to a collection of techniques for describing different facets of the organization. It provides a structured framework, which incorporates different viewpoints that provide insights into the purpose of the system, its operational characteristics and its implication on the roles of the different actors inside and outside the organization. It is a natural extension to information modeling whereby the models target not just the information system requirements but also the enterprise objectives, the work processes, the customer needs and processes that create value for customers. In summary, enterprise knowledge can be logically grouped in terms of three views:

- The *intentional* view. This provides a definition of the organization's goals and objectives that describe the enterprise purpose.

- The *operational* view. This provides a definition of how objectives are realized through the co-operation of enterprise actors.
- The *informational* view. This provides a definition of the information, its structure and allowable operations that ultimately support enterprise actors in carrying out their roles.

The knowledge management process can be described as a systematic process consisting four general tasks: conceptualize, reflect, act and review.

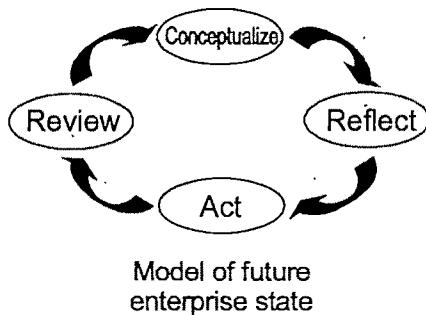


Fig1: Knowledge management process

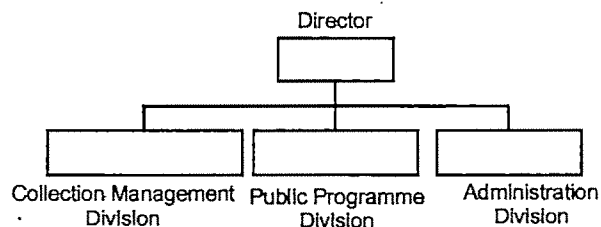


Fig2: Functional description of the Museum organization

The conceptualization phase concerns the elicitation of knowledge from different organizational actors (stakeholders) and its representation using appropriate modeling tools. The reflect phase refers to the analysis of current strong and weak points and about opportunities for improvement of the current organizational state. Based on the analysis enterprise, stakeholders can identify new goals and devise *alternative* operationalisation plans (scenarios) that will bring the new goals into fruition (act phase). Finally, the review phase requires criteria for assessing the appropriateness of alternative scenarios. A summary of the knowledge management process is shown in Figure 1.

III. APPLYING EKM – A GREEK ARTS MUSEUM CASE

To illustrate the application of knowledge management approach we use examples from a Greek arts museum case study. The museum is organized in three divisions namely: collections management, public programme and administration.

The collections management division is responsible for the registration, documentation and preservation of museum's art objects. The public programme division is responsible for the organization of events and the production of museum publications aiming to disseminate information about the collections to the public. Finally, the administrative division is responsible for internal personnel and financial

administration as well as for providing visitors services. Since it is a small museum, more than one of the responsibilities within the three divisions is assigned to the same individual.

The functional organization of the museum is depicted in the following above Figure 2.

Currently, information about the museum's collection is kept only in paper-based form. In order to provide better access to the information held about its art collection, the museum has taken the decision to transform its existing documentation and information provision processes.

According to the knowledge management approach, this involves the following tasks:

- ▶ describe current museum processes using appropriate process models (conceptualization),
- ▶ identify strengths and weaknesses of current processes in relation to the objective of improving public access to the museum information (reflect),
- ▶ deliberate on identified issues and identify the required changes and develop alternative change plans (act), and assess the appropriateness of proposed
- ▶ plans against a number of criteria (review).

The modelling techniques chosen to support knowledge representation in our example are role Activity Diagrams and simple goal hierarchies. Role activity diagrams show the set of activities carried out by individual or groups in the context of their role. In addition, they show how different roles interact in the context of different museum processes. Goal hierarchies illustrate organizational goals and how they are operationalised in terms of organization processes.

A. Conceptualize

The aim of the conceptualization phase is to document knowledge concerning the current museum structure and operation. Such knowledge can be found in existing organizational charts (similar to the one shown in Figure 2 above) and accompanying descriptions of the role of the different divisions.

These documents provide a clear view of the functional organization of the museum according to the individual types of work performed within each museum division. However, they fail to describe the collaboration between different actors within and/or across different divisions. Relevant knowledge is distributed among museum staff and therefore, the conceptualization phase requires their active involvement. Modelling of the current museum processes is facilitated by the use of Role Activity diagrams. Rather than focusing on museum activities within the boundaries of different functions, Role Activity diagrams describe the current museum behaviour in terms of the roles involved in each process, the responsible agents and their collaboration. A model of the 'art object documentation' process is

presented in different ways.

This process is triggered when a new object is brought to the museum through a donation, a purchase, a field collection, or a loan. New objects are brought to the registrar of the Collections Management Division who is responsible for registering all objects entering or leaving the museum. In case of a loan, the registrar fills-in the loan registry and then forwards the object to the Public Programs Division who is responsible for the exhibition that the object is intended. In all other cases, the registrar in co-operation with the curator, decide whether the specific object should be acquired for the collection of the museum or not. If the object is acquired the curator based on his/her knowledge and skills assigns an authoritative name to the object, establishes its use, identifies the materials from which it is composed, decides on the authenticity, or otherwise, of its professed provenance, and generally documents the object. This information is being recorded in free text. In addition, the object is classified, again using an implicit indexing scheme. Finally, the curator decides whether the object should be sent for conservation or it can be moved to its permanent location and the associated information is input to the object record (card) which is then added to the paper-based collections catalogue.

B. Reflect

Conceptualization of the existing museum processes provides the background knowledge for discussing current strengths and weaknesses. This results in the following observations:

Strong points

Cataloguing and indexing is performed for all art objects based on many years of experience.

Weaknesses

Documentation is mostly performed in a free-text form. This has two drawbacks

- a) Free text is often too general lacking the necessary detail to distinguish one object from another;
- b) No standard vocabulary is used which makes difficult the exchange of information with other museums.
 - ▶ No standard mechanism for classifying and indexing art objects is used. Rather information searching and retrieval is based on implicit knowledge of museum staff. This implies the risk of losing knowledge through staff retiring or changing jobs.
 - ▶ The information of art-objects exists only in paper-based form, therefore it cannot be accessed by more than one person at a time, nor is it possible for people to access the information at a distance, e.g., over a network.
 - ▶ Collections catalogue is only accessible to museum staff, which implies that visitors enquiries can be time-consuming on the part of the museum

staff, especially when these cannot be answered by specially prepared information sheets.

C. Act

The next phase in the knowledge management process concerns reflection about the required changes in the museum processes on the basis of the strong and weak points identified and in relation to the objective of 'improving access to the information held about the museum's art collection' and planning the realization of the intended changes, i.e. identifying the changes that should be made on current processes in order to address current problems and achieve new museum goals.

Thesaurus may be refined into the alternative sub goals 'construct a thesaurus' or 'customize existing thesauruses. The result of this activity is the construction of a goal graph containing alternative ways of acting towards realizing the desired change.

D. Review

This final step refers to the evaluation of the 'competing' change options previously identified. The evaluation task is facilitated by the identification of criteria, which can be both qualitative and quantitative in nature, such as implementation costs, efficacy of proposed transformations, feasibility to deliver the proposed transformation in a given time frame, etc.

IV. CONCLUSION

The development of information systems is not simply about designing software components but also about understanding the needs of individuals and other stakeholders within the enterprise and ensuring that the system meets user requirements and business strategy.

The approach presented in this paper is based on the premise that the key to successful development of museum information systems is *knowledge* shared by multiple stakeholders about:

- *where* the museum *is* currently
- *where* the museum *wishes* to be in the future and
- *alternative designs* to effectively bringing about transformations about the desired future state.

This knowledge management process concerns the modelling of knowledge distributed among different museum actors. The models themselves serve as transitional objects – their value is derived from their usefulness in the process of learning that the actors undergo.

REFERENCES

- Sander, M. and J. Perkins, *A Model for Museum Information Management*. 1999, CIMI Consortium Integrated Information Management Working Group. p. 23.
- CHIN, *Collections Management Software Review - Comparative Analysis*. 2000, Canadian Heritage Information Network: Canada. p. 374. Dawson, D. and G. McKenna, *mda*
- Survey of Information Technology in Museums*. mda Information, 1998. **4(1)**. Kavakli, E. *A Knowledge-Oriented View of Web Technology Adoption in Museums*. in *HERCMA 2001*. 2001.
- Athens, Greece: LEA Publishers. Mason, I., *The Social Webs that must be woven: Information Management, Museums, and the Knowledge Industry*. mda Information, 2002. **5(5)**: p. 15-24.
- Blackaby, J. and B. Sandore. *Building Integrated Museum Information Systems: Practical Approaches to Data Organisation and Access*. in *Museums and the Web Conference*. 1997. Los Angeles: Archives and Museum Informatics.
- Oma, E. *The Knowing Museum*. In *Scanning the Horizon: MDA Conference 2001*. 2001: mda. Mason, I. *Knowledge management and cultural institutions*. in *Common Threads, MDA Conference 2002*. 2002.

Assistive Technology for Improving Museum Accessibility

BAISAKHI MITRA

The histories of museums and the histories of their mediating technologies have been inextricably linked¹. Modern museums have always endeavoured to adopt new technologies to meet their missions of interpretation and education. Using available technology museums have developed from mere cabinets of curiosities to the illusory dioramas, from glass-fronted showcases to hands-on inter-actives. In recent times, with the revolutionary developments in Information Communications Technology (ICT) sharing of knowledge through multimedia have made it possible to interpret and present museum objects in new ways. No where is this more evident than in the use of "Assistive Technology"² which aids people with disabilities³ to appreciate and learn from museums. With a view towards social equality⁴ among people, museums all across the world are striving to be more inclusive and accessible. In India the Persons with Disabilities (Equal Opportunities, Full Participation and Protection of Rights) Act of 1995 makes it unlawful for any institute to discriminate on grounds of disability. Since the law was passed accessible designing and innovative gadgets have become important and all museums and cultural institutions are expected to comply with the requisite guidelines failing which legal measures may be taken against them. But very often, the issue of access sends waves of concern among museum curators and directors. Many perceive it as expensive and interfering. However, it has been noted that changes that increase access for those with disabilities can also mean more visitors since most people do

¹ Parry, Ross (2007) *Recoding the Museum: Digital Heritage and the Technologies of Change*, Routledge, London, NY, P137

² "Assistive Technology" (AT) refers to any item, piece of equipment, or product system, whether acquired commercially, modified or customized that is used to increase, maintain or improve the functional capabilities of individuals with disabilities

³ The International Classification of Impairment, Disability and Handicapped (ICIDH, 1980) describes "disability" as the interference with activities of the whole person in relation to the immediate environment.

⁴ Golding, Viv (2007) *Inspiration Africa* in Elizabeth Crooke edited 'Museums and Community: Ideas, Issues and Challenges', Routledge, NY, Oxon, P110.

not attend museums alone⁵. In fact, an experiment has shown that “without replacing the original exhibits, visitor time in the gallery is dramatically increased, previously unpopular exhibits gain new attractiveness, and visitors learn more information”⁶. It is concluded that multi-sensory interpretation can substantially enhance the visitor experience. No where is it more aptly exemplified than in the Jorvik Viking Centre in Edinburgh and “The Trenches” gallery in the Imperial War Museum in the UK. Both these museums have used smell, sound and light to add to the learning experiences at no major cost to the museum.

Besides, India is now home to the world's largest number of blind people. Of the 37 million people across the globe who are blind over 15 million are from India⁷. About 30,000 new cases are being added each year. So, increasing accessibility of museum exhibitions and displays is not only a matter of complying with the government regulations, it also is a good marketing strategy for any museum. So access is no longer just a social and moral issue, it has serious legal and financial implications as well. For museums the most challenging visitors are the ones with vision impairment as museums are primarily visual media housing mostly rare and fragile objects forbidden to touch. With blind visitors using their hands as eyes access to museum objects for them seem to be impossible. However, Assistive Communications Technology has made it possible to share information in a format which had not been possible before. Some such technologies have been discussed below.

1. TOUCH DISPLAYS - With our increased knowledge of human neural processes and the emotional properties of touch, museum curators may be better able to find ways to enhance the experiences their visitors derive from museum artifacts⁸. Museums may provide touch-friendly architectural and sculptural models that make objects accessible to people who are visually impaired⁹. Exact plaster cast replicas can be made using simple technology. These replicas can be touched and small scale tactile models can be handled without the fear of damage to the originals. Supplemented by multi-sensory activities like aromatic installations (with the help of customized Smell Boxes each of which costs about Rs. 500) and sound effects touch displays can be an amazing way of making artifacts accessible to blind visitors.

⁵ Richner, N., Prezant, F., Rosen, P (2006) *All Access Pass: Making a Small Museum Disabled Friendly*, Museum News, July/Aug

⁶ Crowest, Richard (1999) *Multi-sensory Interpretation and the Visitor Experience*, MA Dissertation, Department of Heritage Interpretation, University of Surrey, UK

⁷ Sinha, K, *India has the largest blind population*, The Times of India, Oct 11,2007

⁸ McGlone, Francis (2008) *The Two Sides a/Touch: Sensing and Feeling* in Helen Chatterjee edited 'Touch in Museums: Policy and Practice in Object Handling', Berg Publishers, Oxford, P56

⁹ Hetherington, K (2002) *Museums and the Visually Impaired: The Spatial Politics of Access*, Sociological Review 48 (3), Pp444-63.

2. TACTILE IMAGES - A tactile image is a raised representation of a two or three-dimensional image which is explored using fingertips. They might represent two dimensional works of art (paintings), architectural features and building facades, designs on fabrics or printed designs and diagrams. In order to produce tactile images all visual images have to be redefined. This redefinition may be simplification, alteration, adaptation and sometimes even distortion to convey the important features contained within the visual images¹⁰. Tactile exploration by a blind visitor is a gradual and sequential process and information may have to be given in layers for them to comprehend logically. Tactile images can be made using various kinds of technologies and at various costs. Some popular and less expensive methods are discussed below.

a. **TACTILE IMAGES USING SWELL PAPER** - These are the most common types of tactile images that are used by the blind community. Swell paper contains microcapsules of alcohol embedded in its surface that burst and make the surface of the paper swell up when exposed to heat from a diffuser. Use of carbon-based black ink on the paper increases the effect of the heat and causes the inked areas to rise much more. This paper may also be referred to as Minolta Paper, Microcapsule or Hotspot paper. Some current brands are Zy-tex and Flexipaper. Swell paper tactile images can be made in four ways:

- By photocopying the image onto swell paper. Then putting it through a heat diffuser. This machine raises the black areas of the image by exposing the paper to a hot light. Standard graphics should not be copied to swell paper as an exact tactile copy of a print original will be unlikely to work in a tactile form.
- By printing directly from the computer onto swell paper using laser or inkjet printer and raising the image with a heat diffuser.
- Black markers can be used to draw directly on the paper before raising the image with a heat diffuser. Some types of pens work better than others and trial and error method should be employed to find which works best.
- By applying heat directly on the swell paper using a heat pen.

¹⁰ *Shifting Perspectives: Opening up Museums and Galleries to Blind and Partially Sighted People*, RNIB, London, 2011



Picasso's Guernica reproduced in tactile graphics

With a computer, design software, heat diffuser and swell paper tactile images can be made easily. The advantages of this method are that it is easy to update or edit images and reproduce in bulk. It is also easy to add non-raised print labels to the image using coloured text and the images can be produced up to A3 sizes. The image can be easily visible when raised and is easy to create lines, shapes and textured fills. An A4 Swell-Paper (of Flexipaper brand) costs less than Rs 100 per sheet, a heat-pen about Rs 8000 and a heat diffuser Rs 48,000. A heat diffuser may be shared between two or more museums to bring down the cost of investing in such a technology. Other types of tactile materials available in the market are German film, Wikki Stix and Tacti-mark.

b. **EMBOSSSED IMAGES:** Tactile images can also be embossed¹¹. Embossed graphics are images made up from raised dots. They are usually produced on a Braille embosser which is a device like a printer that is connected to the computer. It punches dots into the paper to make a tactile image. These are also called Braille graphics. The advantage of this system is that once designed, it can be mass-

¹¹ Donnelly, Michael (2010) *Do Touch the Art- A Museum and Galleries Perspective on Access*, Art Access Excellence Conference, Sydney.

produced and is inexpensive. However, these are not very durable and may get easily damaged by repeated touch of museum visitors.

c. **THERMOFORM IMAGES:** Tactile images can also be made from thermoform in which a sheet of plastic (often called Brailon) is heated until it is soft. It is then sucked down over a 3D collage master to produce positive 3D images. This is also called the collage method. But this method is expensive and has a number of limitations.

3. TACTILE AUDIO GRAPHICS: Tactile Audio is another technology that has become popular these days. Tactile audio graphics are a type of tactile graphic that when overlaid on a touch sensitive pad gives additional information in audio format. A tactile audio graphic system consists of a touch sensitive pad that is connected to a computer, a tactile graphic that is placed on a touch-pad, and software for defining areas on the touch-pad and playing back audio information when these areas are touched. Typically the touch pad usually comes with a software package which allows one to define regions of an image and insert text or record a description. When a user explores the graphic and touches a defined region they can listen to audio information attached to that region. Some applications allow several layers of description, for e.g., if a region is pressed a second time further information can be heard. The advantage of this system is that it allows access to information impossible to incorporate in a diagram alone. It adds a new dimension to learning and is also good for visitors without disabilities, especially children. The Talking Tactile Tablet (T3) developed by the Royal National College for the Blind in Hereford (UK) is a device which was made following the above principle. It is a multi-sensory device attached to a PC. Using swell paper diagrams (discussed earlier) placed over a sensor pad with pre-programmable and self-authoring overlays this device can be very helpful to museum learning. It is more cost effective means of imparting information in a tactile and audio form than some others. The T3 (Computer, software, etc) costs less than Rs 1 lakh and the training of personnel another Rs, 50,000. The Royal National Institute for the Blind has also produced a gadget called "PenFriend" which is an audio labeler and is a low cost solution for smaller venues that lets one record a small label for everyday items. Users stick the label on any item and then tap it with a PenFriend to hear it read out. Some museums also use Talking Tactile Pens in conjunction with a booklet that allows visitors to access extensive explanatory descriptions and recordings. The vinyl (waterproof) audio-tactile books are said to be inexpensive to produce and easy to clean.

1. Audio-description: Audio description refers to an additional narration track for the blind and visually impaired visitors of visual media. It consists of a narrator talking through the presentation describing what is happening on the screen during

the natural pauses in the audio. In museums, audio described tours (or Universally Designed tours that include description or the augmentation of existing recorded programme on audio tapes) are used to provide access to visitors who are visually impaired. For this technology to be implemented one needs a trained audio describer, a recording studio and an electronic device to play the recording (transmitters and receivers) and a headset. Experts recommend getting transmitters with multiple channels so that a single receiver can be used for audio-description, sound amplification or translation into other languages. These advanced transmitters permit random access to channels in the hand-held guide¹² that allows the visitor to structure their own path through the exhibition, to go back to previous stations described in the audio guides and listen to descriptions of an object by pressing the appropriate button on their hand-held devices. For more information on this area one can look up websites, e.g. www.vocaleyes.co.uk. Electronic Texts may also be used for sharing information with the blind in which screen readers convey the information on screen to the user via speech or Braille.

5. ON-LINE ACCESS THROUGH HUMAN-COMPUTER INTERFACE: Online disabled access is still a relatively novel field. A study commissioned by the Microsoft Corporation and conducted by the Forrester Research Inc. (2004) has shown that the most commonly used forms of accessible computer technology are accessible options and utilities that are built into most current operating systems¹³. But, designing with accessibility in mind does not mean one has to compromise with what is on offer for the able-bodied. For people with learning disabilities, visual disabilities and reading impairments, print-based text can be completely inaccessible. So, for these kinds of visitors information needs to be given out through alternative formats. Some museums have started experimenting with these kinds of on-line technology. The British Museum had made a database called COMPASS (www.thebritishmuseum.ac.uk/compass) on its website. It consisted of a selection of the museum's best objects available on audio-description.

A prominent TEXT ONLY link at the top of its homepage takes disabled users to the available facilities. The Tate Gallery in London had also initiated the i-Map Project (www.tate.org.uk/imap) during exhibitions on Matisse and Picasso in 2002. This was designed to give access for visually impaired people via the web using raised images, allowing them to be touched if printed on a special printer. However, this may be too expensive for many museums in our country. Another important work in this field was the Museophile initiative (<http://access.museophile.net>) which is a project of the South Bank University that aims to help museums online in

¹² Hein, George E (2005) *Learning in the Museum*, Routledge, NY, P39

¹³ Microsoft Corporation and Forrester Research Inc. (2002) *Accessible technology in Computing-Examining Awareness, Use and Future Potential*

areas such as e-commerce and accessibility. A step-by-step cumulative approach will always work. A museum that provides online audio description of ten objects each year for five years will end up with an appreciable accessible web collection. Various kinds of other on-line facilities are available for people with vision problem and this article is too small a place to discuss all of them.

A few books also have been written on the subject, the first being by M G Paciello (*Web Accessibility for People with Disabilities*) published by CMP Books in 2000. The most authoritative book till date had been written by J Thatcher (*Constructing Accessible Websites*) published by Glasshaus in 2002. The most recent book has been written by J Clarke (*Building Accessible Websites*) published by New Riders in 2003. Access for blind visitors may not be a dream for museums with small budgets. Many access options are low-cost and can be done with simple technologies like height adjustable tables, focused lighting, audio/visual public information system, magnification equipment, etc. The United Nations Convention on the Rights of Persons with Disabilities (UN-CRPD) deals with Assistive Technology for the developing world and explicitly ties a number of signatory nations to providing adequate accessible conditions for their citizens¹⁴. Coupled with national laws and regulations these tools should show us the way to go for making our institutions more inclusive.

BIBLIOGRAPHY

- Bowen, JP (2001) *Tackling Web Design and Advice on Accessible Website Design*, Museums Journal, Crooke, Elizabeth (2008) *Museum and Community: Ideas, Issues and Challenges*, Routledge, NY, Oxon
- Crowest, Richard (1999) *Mulli-sensory Interpretation and the Visitor Experience*, MA Dissertation, Department of Heritage Interpretation, University of Surrey, UK
- Donnelly, Michael (2010) *Do Touch the Art – A Museum and Galleries Perspective on Access*, Art Access Excellence Conference, Sydney.
- Hein, George E (2005) *Learning in the Museum*, Routledge, NY

References

- Hetherington, K (2002) *Museums and the Visually Impaired: The Spatial Politics of Access*, Sociological Review 48 (3)
- McGlone, Francis (2008) *The Two Sides of Touch: Sensing and Feeling* in Helen Chatterjee edited 'Touch in Museums: Policy and Practice in Object Handling', Berg Publishers, Oxford
- Microsoft Corporation and Forrester Research Inc. (2002) *Accessible technology in Computing-Examining Awareness, Use and Future Potential*

¹⁴ Pal, Pradhan, Shah et al (2011) *Assistive Technology for Vision Impairments: An Agenda for the ICTD Community*, WWW 2011 - Web for Emerging Regions Paper, Hyderabad, P7

Pal, Pradhan, Shah et al (2011) *Assistive Technology for Vision Impairments. An Agenda for the ICTD Community*, WWW 2011 - Web for Emerging Regions Paper, Hyderabad

Parry, Ross (2007) *Recoding the Museum: Digital Heritage and the Technologies of Change*, Routledge, London, NY

Richner, N., Prezant, F., Rosen, P (2006) *All Access Pass: Making a Small Museum Disabled-Friendly*, Museum News, July/Aug

National Survey Sample Organisation, 1991

Shifting Perspectives: Opening up Museums and Galleries to Blind and Partially Sighted People, RNIB, London, 2011

Educational impact of museum on their visitors: the role of 21st century museums

PUSPA DAS

Introduction

The meaning of the word “museum” had a variety of changes through the centuries. In classical time, it signified a temple dedicated to the Muses. Nine Greek goddesses of the epic, music, love, poetry, oratory, history, tragedy, comedy, dance and astronomy were known as the Muses. The next phase of development of museums is associated with the Renaissance. Initially, collecting of objects was of prime importance during the 14th century and it continued till the 17th century¹. In the 20th century, the primary role of museum was shifted from collecting objects to classify, document, conserve them, and put them on display. The museum was generally recognized as an important public institution. Museum today totally changed their role, they have to justify their existence much more effectively, must generate far more of their own income, must stress importance on their audience, and must enhance themselves as ‘learning institution’. Society is also gradually changing day by day. The ‘traditional audience for museum’ is far less willing to put up with the second rate or to accept a passive role. Visitors have many more demands on their leisure time, thus museums must compete in the modern world for their audiences and should use their resource against other leisure activities. There are many museums and other heritage attractions with emerging ones but the audience at best static against each other.

A museum bridges its ‘aesthetics past’ with its populist and ‘market oriented present’². Museums entered a time of change, they are asked not only to justify their finding but also to redefine their role in society³. In 2007, ICOM modified the definition of museum. This definition states that a museum – ‘acquires, conserves, researches, communicates and exhibits the tangible and intangible of humanity and its environment for the purposes of education, study and environment’. Generally, education means the training and development of human beings and their capacities by implementing the appropriate means to do so. Museum education

¹Gary Edson and David Dean, Handbook for Museum,(London: Routledge Publication,1994), p.3

²Graham Black, The Engaging Museum,(London: Routledge publication,2005), p.26

³Christian Walth, Museum for Visitors: Audience Development – a crucial role for successful museum management strategies. www.intercom.museumdocument/1-4waltl.pdf (accessed November 12, 2012)

can be defined as a set of values, concepts, knowledge and practices aimed at ensuring the visitor's development. It is a process of accumulation, which relies on pedagogical method of development, fulfillment and acquisition of new knowledge. We know that museum education is not a 'formal education', the way is indirect teaching-learning method called 'informal education'. We can get the information about our world from a museum. Education is the mobilization of knowledge steaming from the museum and aimed at the development and fulfillment of individuals, the development of new sensitivities and the realization of new experiences. We can mention the concept of museum activities or cultural action like that interpretation or mediation are often invoked to describe the work carried out with the public in the museum efforts at transmission. Museum hold resources that provide opportunities for others services and benefit to the public⁴.

ROLE OF MUSEUM EDUCATION IN OUR SOCIETY:

Museum have changed rapidly in the 20th century from 'cabinet of curiosities' with thousand of objects presented in a didactic ways, to bring about ideas: actively encouraging learning, debate, critical thought and action, as well as dealing with complex global issues concerning sustainability and social justice. Museums have always seen themselves as having some kind of educational role⁵. Education is beginning to be explored by museum Professionals in new ways. In the past, education has been equated with scholarly knowledge. This has been true for educational theorist and for museums. As education has been redefined in society and the concept broadened to include more than merely formal to informal institution so education in museums has come to have a very broad perspective. Instead of meaning the organization of workshops or guided tours for school or other formal groups, education in museums is now understood to include exhibitions, workshops and publication, for a wide range of visitors from different walks of life. Museum education may take place both in the museum and its community⁶.

MUSEUMS ENGAGING VISITORS THROUGH EDUCATIONAL PROGRAMME:

In the past, the chief orientation of a museum was creation of displays and making provision of public access to them. In the 21st century museum, priorities include access and comfort, eating and shopping, flexible exhibiting and thus overall

⁴Andre Desalles and Francois Mairesse (ed), *Key Concept of Museology* (Singapore: Armand Collin, 2010), p. 31.

⁵Lynda Kelly, Development of a model of museum visiting, Museum Australia Conference, Canberra, April 2001, audience_research.wikispaces.com/file/view/whyvisit_paper.pdf (accessed November 21, 2012)

⁶Eilleen-Hooper Greenhill, *Museum and their Visitors* (London: Routledge Publication, 1994) p. 142.

engagement of visitors. These priorities will help reflect a requirement to generate income and to meet the needs of leisure oriented audience as well as ambition to engage visitors with collaboration⁷.

Museum professionals make the education program schedule inside or outside of the museum. Museums throughout the year arrange exhibition cum education program and people see and enjoy. Museum personnel also arrange out-reach programme and reach the people and the people feel it easily accessible to their mind. The museum offers hands on experiences, which are designed to encourage participants to examine object, artifacts and reproductions that provide educational and entertaining explorations in the science, humanities and arts. We may discuss about the following diagram showing how museum work outside the museum.

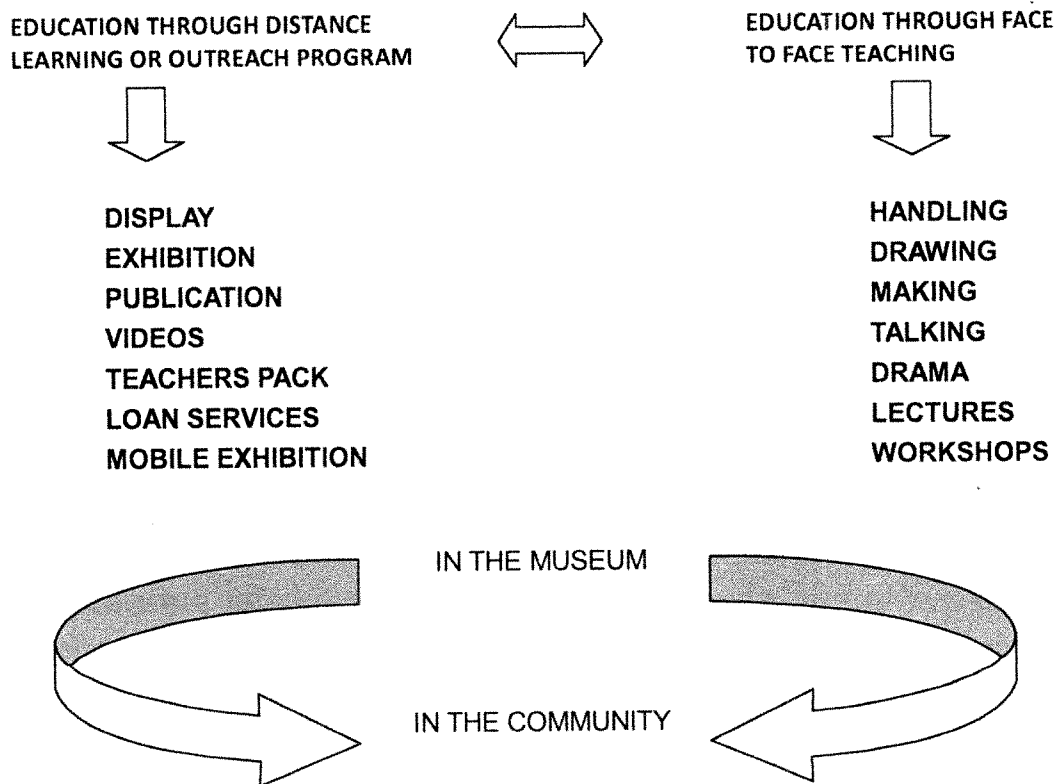


Figure 1: The educational task of the museum (Eileen-Hooper-Greenhill, 1994)

⁷Graham Black, *The Engaging Museum* (London: Routledge Publication, 2005) p. 267

Most museums today are very conscious that they need to expand their supporting constituencies. Museum and galleries are opening their doors and are taking their education staff and collection outside into the community center, hospitals, prisons and school, disabled group, non-visitors museum person etc⁸.

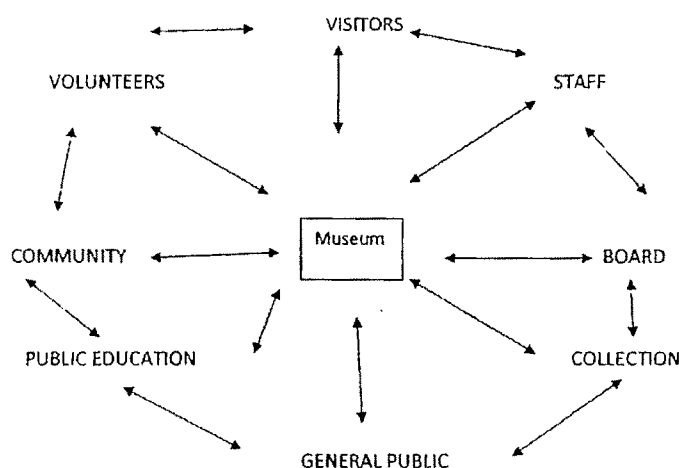


Figure 2 : Museum Out-reach & perception (Gary Edson and David Dean, 1994)

As part of the outreach process, the museum can inform the public about the activities associated with collection, care, research and exhibition preparation. For years, museums have perpetuated the concepts of reserve and understatement when addressing the inner working of the institution. Few people have had the opportunity to view the museum from the others side of the exhibition i.e. the working side. Museums must take the initiative in shaping the public perception perpetuating the image of institutions essential to social and civilized well-being. The close ties that exist between the development of a society and the institutions of culture represent that society are well documented. That society evolves at different rates is a factor that affects both the number and quality of the institutions comprising the cultural section. Progress has been made towards full utilization of museums as institutions of learning and social development⁹.

Now we can follow some examples, like one of the organization "MANTHAN EDUCATIONAL PROGRAMME SOCIETY OF INDIA". They aim at a continuous development for the betterment of the nation by bringing about a change at the grass root level. Thus, one of its ways is the generation of scientific temperament

⁸Eilleen-Hooper Greenhill, *Museum and their Visitors* (London: Routeledge Publication, 1994) p. 142-143.

⁹Gary Edson & David Dean, *Handbook for Museum* (London: Routeledge Publication, 1994) p.10-11.

amongst masses across the country. Their several outreach programmes are aimed at promoting public awareness in understanding of science and making informal contribution to science education using low-cost approaches. MANTHAN not only aims at the students but they work on many projects related to others community development. In a country like India, outreach activities play an important role for the development purpose. In India, there are thousands of thousands of villages and semi-urban areas, large amount of population of the country resides in interior regions, so it become difficult for them to reach to informal educational centers like science centers, museums, libraries, social organizations etc. Thus through the outreach activities, MANTHAN tries to educate people in the form of hands-on activity kits, mobile exhibitions, offshoot materials, awareness campaigning, posters, drama etc.

CONCLUSION

ICOM's ethics of museum says that museums hold resources that provide opportunities for other services and benefits to the public. Museums focus on informal education rather than formal education. Therefore, museum needs to apply informal education to their visitors and needs-driven formal and curricular activity. Community based museum and gallery education represents most innovative aspects of museum day¹⁰. However, many museums have reached out to a wide range of programmes for new audiences including the disabled people, those people who are unable to come to museum but museums come to their house and enjoy both of them by their own way. At present scenario, museum today continues collaboration with social organizations like Club, NGO etc., conducts outreach programme into their premises, and expand museum spaces to static facilities¹¹.

Nowadays, government is also encouraging this type of programme and providing financial support. According to Kotlar and Kotlar (1998: 268) 'the most successful museums offer a range of experiences that appeal to different audience segments and reflect the varying needs of individuals visitor. Successful museums provide multiple experiences: aesthetics and emotional delight, celebration and learning recreation and sociability.

REFERENCE

- Alexander, P. Edward, & Mary Edward. *Museum in Motion: An Introduction to the History & Functions of Museums*. Lanham: Rowman and Littlefield Publisher, 2008.
- Black, Graham. *The Engaging Museums*. London: Routledge Publisher, 2005
- Desalles, Adre & Francois Mairesse, eds. *Key Concept of Museology*, Singapore: Armand Colin, 2010.

¹⁰O'Neill, (1991) p.143

¹¹Edward, P. Alexander and Mary Alexander:2008, p. 290

- Edson, Gary, and David Dean. Handbook for Museums. London: Routledge Publisher, 1994.
- Hooper-Greenhill, Eilean. Museum and Their Visitors. London: Routledge Publisher, 1994.
- ICOM, 21st General Conference in Vienna, Austria, 2007
- Kelly, Lynda. Developing a Model Museum Visiting. Museum Australia Conference, Canberra, April, 2001. audience_research.wikispaces.com/file/view/whyvisit_paper.pdf (accessed Nov.21,2012)
- Waltl, Christian. Museum for Visitors: Audience Development- A crucial role for successful museum management strategies, www.intercom.museumdocument/1-4waltl.pdf (accessed Nov.12, 2012)

Exploring visual communication in display – an integral part of science communication in science museums/centres

SAYANI GHOSH

Introduction

Technological upgradation of museum exhibits from traditional display methods to engaging interactive installations creates a new kind of interactions, which can arouse visitors' expectations and interests. People here in science museums gather information well as education. But today, the environment of information resource has changed a lot. Here the experience of Edutainment is the fundamental source of museum communication, a special type of communication with innovative experience. With the emergence of diverse audience, and emerging multimedia based installations, the traditional display methods turned into a digital story telling environment with multi-faceted exhibition where an object can directly interacts with us. There are different types of graphic representation along with the display setup such as labels, charts, graphs, display graphic panel, wall murals, interior floor graphics, exterior wall murals, banners, way-finding signage, eco-friendly signage, exterior floor graphics, ceiling murals, stand-up displays, pop-up banner stands etc. Besides interactive hands-on exhibit those are also a matter of learning in museums. If the exhibit information is associated with audio-visual development, expert lighting and high quality writing and editing, it would be able to create a successful exhibition.

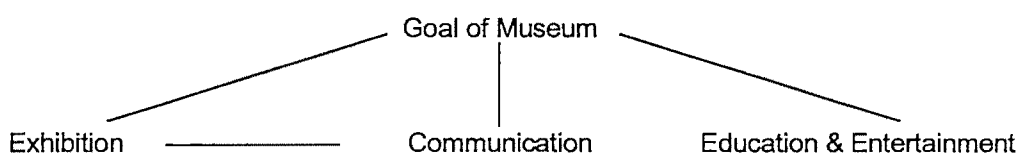
Informative Visual Graphics – A storytelling experience

In Science and technology museums, we generally found different types of visual graphics, such as charts, graphs, labels, and now-a-days, they are adopting graphic panels and which are vinyl printed, can make a story alone, standing by the exhibits. Usually, labels and display panels should be informative in its significance. Visitors come to know about any object or exhibitions, to read and follow the exhibit texts. Exhibit texts carry information which is considered to be essential to the understanding and appreciation of the objects. Exhibit texts or display panels, regardless of their contents, ought to be legible to all. Considering the legibility of the exhibit texts, the question that arises is, Do visitors really bother about reading the labels on the exhibits in Science & Technology museums? Here the only thing that matters is the legibility of labels to all aged visitors from children to older people

and the language should be understandable, words should be limited and briefly informative and the approach and appearance of the label should be lucrative and aesthetic, which can attract visitors to read them. While designing an exhibit label, the designer should consider the size of the text measuring the distance from the visitors' eyesight. The exhibit texts should not only capture but hold the attention of the visitors. There should more research work done for how to locate the graphics in museum environment. The above said criteria are not the last but there are lot of visual criteria along with these to enhance the visual communication of museums and which are visitor friendly.

Visual Design & Communication

Visual communication design is very necessary for the science and technology museums for developing creative visual responses of visitors. The dynamic and rapidly evolving graphic design with multimedia approach plays a greater role today than ever before. By adopting new technologies everywhere in museum exhibitions, they adopted new techniques and technologies in panel design that also gives today's information more gluttoned and transparent. Here, the role of the museum curator or exhibit designer as a visual communicator of ideas, create more strategic planning than ever before. In Science and Technology museums, where every exhibits says a lot by implementation of digital and modern technologies, their competition arises between the exhibits and the exhibit texts. The challenges between texts and hands-on exhibits in now-a-days become a matter of thinking. We all know Science museums/centres are considered as an institution of informal learning. The learning takes place through integrated studies of illustrations, graphic design, interactive technology and advertising. It could be more clearly found according to the visitors response and their expression after visiting a gallery with full of audio-visual aids along with exhibits. The following figure depicts the goal of the Science and Technology museums/centres,-



Visual Communication in Indian Science Centres

In India, most of the science and technological museums are operated by National Council of Science Museums (NCSM). Around 27 science centres are functioning under NCSM including Birla Industrial and Technological Museum (BITM), Kolkata, National Science Centre, New Delhi, Science City, Kolkata and many more regional and district science centres along with a planning of some new science centres.

Development of Science and Technology in the mind of young students is the measure of progress, prosperity and strength of a Nation. It is here that science museums/centres come to play a vital role in imparting knowledge through audio-visual methods and in fostering industrial development. The graphical representations along with hands-on exhibits bring text books science alive. The excellent example of beautiful and attractive visual graphics (i.e. photographs, charts, maps, panels) is thematically exhibited in Earth exploration hall of Science City, Kolkata. Likewise, in National Science Centre, New Delhi, we can notice that in water gallery, the exhibition/gallery designer designed the labels and other visual graphic panels in such a way that it can tell a whole story from the origin of water to its today's scenario- the crisis.



*Display Panel in Earth Exploration Hall,
Science City, Kolkata*

Like the nationalised science centres, the small district and regional science centres are also not far behind. They also tried to modify their visual panels, labels and other audio-visual aids to popularise science in our



*Display panel in Digsha
Science Centre*

remote areas of our country. Though due to some reasons, they are far behind to adopt new digital technology in their display and display panels but by the



Water Gallery in National Science Centre

colourful labels, graphic panels they are serving their purpose as far as possible.

In brief, the labels or the visual graphics along with proper associated environment can fulfil the goal of these museums/centres which include the increase of interest level, understanding of object or exhibits through these proper interpretation, fill the communication gap, provide educational and entertaining environment and last but not the least, it can boost up the visitor attendance in those museums.

Conclusion

It is necessary to take graphic design more seriously and to assess it critically to

enhance the aesthetics of exhibition. The graphics designs of exhibit texts, panels, and murals should be done according to the subjects, story and need of the context of exhibits, keeping in mind that visitors are going to be more involved in multimedia interactions rather than reading the texts, that holds the prime difference between art & archaeological museums and science museums/centres. The conflict arises between the traditional ways of representation and today's representation through digital technologies, where exhibit texts or visual graphics are more neglected in science museums, so it is the high time for the science centres to evaluate their visual communication to make an exhibition more fruitful.

Bibliography

1. Pearce, S. (Ed). (1996). Exploring science in museums .*New research in museum studies*, (Vol 6.). London: The Athlone Press.
2. Sehgal, N. K. (2005). *The changing role of science centres and museums in developed countries*. Delhi: Daya Publishing House.
3. Mukhopadhyay, I. K. (2005). The science centre movement in India: A conspectus, *História, Ciências, Saúde – Manguinhos* (Spanish ver.), (Vol. 12), pp. 281-307.viewed on 13/04/2011, available from <http://www.scielo.br/pdf/hcsm/v12s0/13.pdf>
4. Ghosh, P. (2012). Museum-Unique learning environment for secondary science education, *Journal of Indian Museums*, (Vol. LXVI), New Delhi: Museum Association of India.

Brain museum

SANGITA MUKHERJEE

Introduction

The brain is the centre of the nervous system in all vertebrate and most of the invertebrate animals. It is located usually in the head region, mainly close to the primary sensory organs. The brain of a vertebrate is the most complex organ of its body. The adult human brain weights on average about 3 pounds (1.5 kg), with a volume of around 1130 cubic centimetres (cm³) in women and 1260 cubic centimetres in men. Men with the same body height and body surface area as compared to women have an average 100gm heavier brains. But the difference does not correlate with intelligence quotient (IQ) or other measures of cognitive performance. Human brain is divided into hindbrain, midbrain and forebrain. Hindbrain and midbrain together form the brainstem. Forebrain includes the cerebral cortex, which is the largest part of the brain and is estimated to contain 15 – 33 billion neurons. It can also be divided into the left and right hemispheres, which are connected by thick bundle of neurons. During human evolution the forebrain becomes larger as the cerebral cortex increased in size. For this the brain mass becomes more folded to fit inside the human skull. This gives the brain a walnut appearance. Human has a larger cerebral cortex relative to the rest of the brain parts than any other animals. This cerebral cortex handles many of our unique skills like language and problem solving. Common people do not have a clear idea about the human brain, which is responsible for the performance of all the sensory organs, such as vision, hearing, balancing, taste, smell and every action and reaction of a human being. Most of the people consider only the cerebral cortex as the total brain. Even they are actually not that much aware about the various diseases affects in the brain like parkinson's disease, alzheimer's diseases, schizophrenia, etc. Now if there is a museum, which describes and reinforces all those knowledge and awareness about the human brain, it will be a unique and useful museum experience to the common people.

Instances in India

In India, there are two museums, which we can actually call as Brain Museum, e.g. *Brain Museum at the National Institute of Mental Health and Neuroscience (NIMHANS), Bangalore.*

The Brain Museum has a diverse collection of 300 human brain samples. A complete different kind of museum has been set up in the Bangalore city by

NIMHANS hospital around 1995 with support of the central government's Department of Science and Technology, Department of Biotechnology and the Indian Council of Medical Research (ICMR). Initially these were used only to teach the students of neuropathology and to promote research in neurobiology using human tissue. But Dr. S. K. Shankar, professor and head of the department of neuropathology made the museum open for the public. Brains are preserved in formalin-filled jars. A brain sample can be preserved for 20 years. Every year, this museum adds more collections of brains to their repository by brain donation. This museum have the brain of a person died in a road accident as he was not wearing a helmet and it has also the brain of a person who died due to injury to his lower brain and spinal cord because he was not wearing a seat belt. Showing these brains to the visitors mainly to children this museum is spreading awareness about the effect of road accident due to ignoring the use of helmet and seat belt while travelling. In this museum diseased brains are also displayed for increasing the conceptions about the effects of diseases like schizophrenia, alzheimer, etc. This museum unfolds the function of human brain, its reaction to different situations and chemical reactions inside the brain with the help of different diagrams. This museum is open to public only on Saturday from 10:00 a.m. to 3:00 p.m.

Address: Hosur Road, SR Krishnappa Garden, Hombegowda Nagar, Bengaluru, Karnataka 560029, India.

Museum of Brain & Mind, Nagpur

Inspired by the "Rock Garden" of Chandigarh, Dr. Avinash Joshi (M.D.), Psychiatry from KEM Hospital, Mumbai thought of creating "Brain Garden" to show all the facets of brain, like its anatomy, physiology, psychology, psychiatry, neurology, neurosurgery, parapsychology, philosophy, sexuality and spirituality. Brain is the most complex structure in the Universe. In this museum, an attempt has been made to show all its faces through displays, written in simple Hindi, using abundant self illustrated images. Starting from the history of psychiatry and barbaric methods of treatment of psychiatric illnesses, the journey travels through evolution of the thought process of mankind to the modern knowledge about brain and mind. Neurological problems from headache to brain tumours and psychiatric problems ranging from anxiety, depression, bipolar disorder, obsessive compulsive disorder to schizophrenia, are explained in simple language. The effect of mind and brain on physical illnesses and vice versa has been extensively dealt with. Although people have a lot of curiosity about brain and mind. They also harbour misconceptions about it. It also provides psychological tips of day-to-day living. A special section has been dedicated to psychological problems of children. The museum is useful for teachers and students to understand each other in a better way. Emotional problems such as anger, fear and personality problems have also

been sufficiently dealt with. A confession box is put up for those, who are haunted by their mistakes and want to relieve themselves of the burden. Those expecting counselling may disclose their identity. Professional secrecy is assured for them. The museum is open on all weekdays from 03:00 pm to 09:00 pm.

Address: Museum of Brain & Mind, Swami Arcade, Above Dena Bank, Near Batuk Bhai Jewellers, West High Court Road, Dharampeth, Nagpur 440010(M.S), India.

Brain collections from abroad

Brain Museum at School of Medicine and Biomedical Sciences, University of Buffalo (The State University of New York)

In this museum, more than 80 beautifully illuminated brain specimens highlight anatomical features, such as the corpus callosum, hippocampus and cerebellum. Pathological specimens show conditions, such as alzheimer's disease, cerebral aneurysms and hydrocephalus. Dissections show the full pathways for vision and hearing, and photographs offer closer views of the brain's intricate structures. Display highlights the achievements of groundbreaking researchers in neuroanatomy sets and the discipline in its historical context. The museum also houses an excellent collection of slides showing the stained cross-sections of brain tissue. Medical students and researchers can consult by arrangement with the Department of Pathology and Anatomical Sciences.

Address: 360 Biomedical Education Building, University at Buffalo, South Campus, 3435 Main Street, Buffalo, N.Y. 14214

Wilder Brain Collection

Over 600 human brains were collected in the Wilder Brain Collection, but due to years of neglect and their poor storage in the Cornell University basement, many samples of the brain deteriorated over the years and had to be carried out from the basement via buckets. Despite this, an effort was made to retain the most interesting brains and today the collections still contain some 70 intact human brains. Special emphasis was made to acquire brains of famous people. The collection includes suffragist Helen Hamilton Gardener who donated her brain in 1925 to prove that woman's brain was in no way inferior to a man's, and the gray matter of Edward Howard Ruloff, a convicted murderer who was hanged in 1871. Wilder himself donated his brain upon his death. Eight brains, including the above mentioned, are on display in Cornell University's Uris Hall. The other 62 are still kept in the basement. Address: 159 Sapsucker Woods Road, Cornell University Museum of Vertebrates, Ithaca, New York, 14850-1923, United States.

Brain collection at the University of Texas at Austin

The brains in this collection suffer all from abnormalities and are preserved as aids

to study mental illness. Labelled and assigned case numbers, they could serve to advance the study of brain abnormality and function, yet they have left mostly ignored for 30 years. University knows firsthand the importance of studying the most complex organ we possess, and learning how to keep it healthy. With federal funding for brain research becoming a priority, hopefully the valuable collection locked away in the halls of the University will be put to use, and this will unlock the secrets they kept.

Address: 1 University Station, Austin, Texas, 78712, United States

Brain Museum, Lima, Peru

The museum has an inventory of 2,998 specimens and is still growing. Diana Rivas is a neuropathologist, who runs a little-known brain museum in the Peruvian capital. Primarily the neurology students and other academics in the field must see the museum. The Brain Museum is also open to the public, in part to spread awareness about the preventable brain diseases. The samples are kept in formaldehyde-filled jars. The modestly-sized museum is packed with morbid examples of stroke, alzheimer's, tumours and trichinosis, but the star of the show is the Creutzfeld-Jacob disease specimen, commonly known as the human strain of mad cow disease.

Address : Instituto Nacional de Ciencias Neurológicas , Jr. Ancash 1271, Lima, Peru

Aarhus Hjernesamlingen – Aarhus Brain Collection

The result is the brain collection at the Aarhus University Hospital Centre for Psychiatric Research, possibly the world's largest collection of brains from subjects, who suffered with various mental illnesses: From 5,500 brains plagued by dementia, 1,500 with schizophrenia, 300 with depression, and 300 with bi-polar disorder to single cases of rare diseases, the brains came from patients committed to state mental hospitals throughout Denmark. The specimens have been meticulously catalogued, and full patient records are available in many cases.

Approximately 9500 brains were removed, sampled, and preserved by a variety of techniques, including an estimated 250,000 histological slides and 50,000 pieces preserved in paraffin blocks. The Aarhus Brain Collection is sadly not open to the public, but Aarhus University Hospital is a part of BrainNet Europe, a consortium bringing together many institutions in possession of brain collections for use by medical professionals.

Address: Aarhus University Hospital Centre for Psychiatric Research, Skovagervej 2, Risskov, DK-8240 Risskov, Denmark

Conclusion

Human brain has a highly complicated structure and actively does many functions.

People even cannot imagine that brain with approximately 100 billion interconnected nerve cells how it works for different parts of the body. Brain contains everything that one has learnt within the memory. Memory is the filling system of brain and it stores a vast amount of information. When one sleeps, the body's energy restores and helps commit to things in memory that happened during the day. Although having these amazing facts brain has little capacity to regenerate. It is vulnerable to the effect of damage and diseases. Losing part of the vast networking within the neurons or changing the neurotransmitter it can have devastating results. With the help of brain museum people can be made aware about the cause and effect of various brain diseases, functioning, its role in case of emotion, learning capacity of an individual and so many different disorder among human being due to the chemical imbalance in brain. This type of museum experience can change the society's view about those people who are suffering in illness of brain.

References

Brain Museum. (n.d.). Retrieved May 30, 2013, from <http://www.atlasobscura.com/places/brain-museum-neurology>.

Brain Museum. (n.d.). Retrieved June 14, 2013, from http://medicine.buffalo.edu/about/community_outreach/neuroanatomymuseum.html.

Your Brain. (n.d.). Retrieved June 18, 2013, from <http://www.sciencemuseum.org.uk/WhoAmI/FindOutMore/Yourbrain.aspx>.

Vyas, H. (2013, March 3). Get your head around the brain museum. *The Times of India*. Available from http://articles.timesofindia.indiatimes.com/2013-03-03/bangalore/37409447_1_brain-donations-brain-or-body-brain-museum.

Audience Development: A Necessity for Museums of Today

ENAKSHI CHATTERJEE

Museums at present are at a point of sea change. In the course of development, museums have responded to changing intellectual current and socio-political conditions. As a result new types of museums have started coming up on various subjects such as children, railways, handicrafts, folk art, maritime heritage etc. This in turn led to development in museum theory, practice, technique and concept on the whole. It does not imply however that the core functions such as collection, documentation, preservation and research are no longer important. What is implied is that these functions are to be assessed in the light of a new context. Even ICOM in its Code of Ethics rewritten in 2002 defines the museum as : " a non-profit making permanent institution in the service of society and of its development, open to the public, which acquires, conserves, researches, communicates and exhibits, for purpose of study, education and enjoyment, the tangible and intangible evidence of people and their environment." There is only a slight shift from the core functions in the sense that museums have started viewing these functions in a more visitor centric way. In other words, whereas museums aimed at collecting, displaying and preserving their collections, now adopting a more *visitor oriented approach*.

It will thus be no exaggeration to say that a present day museum is incomplete without visitors. Visitors are the backbone of a museum. Without them the grand museum buildings, precious objects or technically upgraded exhibitions would be nothing but empty and lifeless without any purpose. Museums are thus being asked not only to justify their funding but also their role in the society. These days museums have become universities of people and are centers of knowledge. In fact they have become the source of education, especially informal education and their primary objective is to offer an educational experience that helps in serving the specific requirements of the visitor.

Despite adequate funding the survival of the museums are by no means guaranteed. An active interaction and dialogue with existing and potential visitors is essential. These days it is not the quality of collections that matter but the interaction of the visitors with the collections and visit of potential visitors to the gallery which plays as the key factor for the survival and development of museums. For this purpose it is absolutely necessary that museums take up **audience development** as an important component of their management strategy. **Audience development** is an Anglo-American led term, which has found its way into Central

Europe and describes a very powerful process of improving upon the existing museum services to the existing museum visitors and also reaching out to the potential audience. The term **audience** here describes all the people who might come into contact with the heritage and collection of the museum. It also includes all of the people in the local community and the wider community the museum serves, who form the potential audience. It is not a very simple course of action but a well-planned and targeted process which involves almost all areas of the museum working together to deliver the museum's overall aims and objectives to higher standards.

Significance of Audience Development

- **Safeguarding the heritage** – Involving and engaging more and more people with their heritage and developing a broader base of support will ensure that the heritage is preserved for the future generations.
- **Being Fair** – It is absolutely necessary that the organizations such as museums that are mostly funded by public funds (at least in developing countries like India) provide maximum benefits as widely as possible in the society at large.
- **Cementing a Wider Relationship** – Audience development can provide greater opportunities for organizations to develop partnerships with other agencies and institutions thereby catering to the wider goals of the community at large and improving their own position.
- **Building Stronger Organizations** – Audience development is all about a proper management policy for the establishment of museums as more dynamic and confident institutions that safeguard the past and enrich the future.

Audience development can encompass marketing, education, outreach and community development, and often works best when different approaches come together to engage people. Developing audiences requires organizations to make changes and try new things. It needs everyone's support and buy-in, including senior and front of house staff that conserve, curate and maintain heritage sites and collections, and volunteers. Audience development is about taking action to put people centre-stage. It involves making an effort to understand what they want and presenting the heritage, collection or activity of the museum in a way which is accessible, inviting and meaningful for them. It involves changing people's perceptions of heritage and building on-going relationships to encourage participation and support from as broad a range of people as possible for the long-term. For Hans Christian Anderson (2005) audience development implies, "enriching the experience of your visitors by helping them to learn more and deepening their enjoyment of what you have to offer. It there combines the aims of the curator, educator and marketer.

The museums these days are also a part of the service as well as the leisure

industry which means that they are working in collaboration with all stakeholders to achieve user satisfaction at a time when expectations on service quality is increasing. Thus in order to successfully implement audience development it is necessary that museums offer ample opportunities for visitor engagement. The process of establishing museums for the community at large goes simultaneously with a transformation of museums that engage and involve visitors and change from being product oriented to visitor oriented. In order that museums are successfully able to engage the visitor in the process of communication, it is necessary that museums become more open and accessible, meeting visitor requirements thereby achieving greater satisfaction of the visitors. A museum that focuses on its audience shares a dynamic relationship between its programme activities and the audience. They cease to be institutions that prove to be 'dumb' to the common man. Extensive audience research is therefore an extremely component that leads to a successful audience development policy. Graham Black (2005) rightly argues "...if museums acknowledge that they should be audience-centered, a properly resourced programme of visitor studies should be an essential, systematic element of museum's activities."

Goals of a sustainable audience development policy

1. To refine and enhance communication with the visitors.
2. To achieve an attainable and sustainable audience.
3. To turn non visitors into visitors, visitors into repeat visitors.
4. To enhance access.
5. To offer multiple experiences.
6. To engage visitors (hands on and minds on).
7. To establish an active network with special target group.
8. To develop a comprehensive policy to look into the needs of social groups that are underrepresented viz. older people, certain sections of the youth, differently abled people, minority groups, people with lower level of education, people in lower socio-economic groups and on low incomes.

There might arise a number of barriers in the process of visitor participation such as-

Organizational- Whether the museum is welcoming and inclusive, whether the staff are helpful to visitors and whether the opening and closing hours are in any way restricting any particular section of visitors.

Physical- Whether the museum is accessible by public transport and easy to locate and whether it is providing sufficient facilities for everyone.

Sensory- Whether it is easy for differently abled visitors such as those who are visually or hearing impaired to appreciate the museum collection using their restricted sensory power.

Cultural- Whether the museum reflects the interest of people from a wide range of cultural backgrounds and whether it makes an effort to relate the collection and heritage to their interests and concerns.

Intellectual- Whether it is easy for the visitors to comprehend the meaning of the collection and its relevance and whether the museum makes conscious effort to cater to every section of the society such as visitors with learning disabilities, children, older people and people with limited background of knowledge.

Financial- Whether visiting the museum too high for some sections of the community, whether the museum shop and cafeteria etc. are too expensive and whether the museum provides value for money.

Not all visitors are in a position to make contextual links with what they see in the museum display without any interpretive help. This was not a problem in the past as earlier museums catered to a handful of people in the society who were generally the intellectual elites of the society. They believed more in research, collection and preservation rather than providing education as well as recreation to the community at large. As a result a significant section of the community avoided the museums with the attitude that museums held nothing in particular for them to see or they had nothing to do with their lives. Nowadays with museums broadening their perspective as well as audiences they are becoming more accessible to the public, technically and methodically more advanced, interpretation tools have become a significant component of visitor engagement. Tools such as **touch-screen kiosks, audio guides, digital storytelling, and walk-in-dioramas** along with trained interpreters are making the museum experience more meaningful to the visitor thereby creating a successful communication channel between the collections and the visitors. Engaging visitors in an interactive experience is much more likely to give a positive result leading visitors to return to the museum in future. Along with this visitor amenities and comfort must necessarily be looked into to provide a relaxed and interesting viewing.

Nowadays, museums have become spaces for social interaction with space for recreation, in order to set up a successful communication channel museums have to be dynamic in devising a successful audience developing strategy. Since museums in developing countries like India are mostly public funded, people in these countries are becoming more and more educated and aware, higher demands and expectations of public satisfaction are arising. A well planned strategy will help the museum, based on the understanding of the requirements of the visitors, to move efficiently from present to future.

Reference and Bibliography

Anderson, Hans Christian(2005) vide *Museums Journal* vide www.intercom.museum/documents/1-4/waltl.pdf accessed on 15th June 2013

Black, Graham(2005) *The Engaging Museum-Developing Museums for Visitor Involvement*, Routledge, London

Hooper-Greenhill, Eilean(1999) *Museums and Their Visitors*, Routledge, London

Hooper-Greenhill, Eilean(1999) *The Educational Role of Museums*, Routledge, London

Kotler, N and Kotler, P (1998) *Museum Strategy and Marketing: Designing Missions, Building audiences, Generating Revenue and Resources*, CA Jossey Bass, San Francisco.

Websites:-

www.intercom.museum/document/1-4/waltl.pdf accessed on 16th August 2013 at 2.45 pm

www.bmag.org.uk/uploads/AudienceDevelopment Strategy accessed on 16th August 2013 4pm

The influence of museums in social change

SUDAKSHINA MUKHERJEE

Museums are the best tools of social change. They educate, enhance and proliferate knowledge within and beyond the museum. They are a great source of information and evidence from our glorious past. Archaeologists, anthropologists and several other experts in their relevant fields have been successful in collecting evidence related to our varied ancient and lost culture.

Museums have been entrusted with the task of documenting and preserving these vital evidence safely for posterity. The main tasks of a museum now include:

Collecting and acquiring objects

- Documenting or registering the collections in a scientific manner
- Preservation (curative and preventive) and conservation of objects,
- Exhibition or display of objects
- Interpretation and communication of both tangible and intangible objects to the visitors.
- Communication with the public.
- Providing access and accessibility
- Care and security of collections.
- Organizing programmes and activities for the visitors
- Social and cultural enhancement of the visitors.
- Providing economic opportunities to the local people.
- Controlling finance and accounting procedures..
- Involving the local community and ensuring their livelihood
- Presenting and displaying objects in an interesting manner
- Providing heritage education to the people .
- Care of building and maintenance of museum..
- Making a forward plan of the museum.
- Deciding the operating and capital budgets of a museum
- Marketing the museum.
- Enhancing the museum publications to attract visitors
- Looking out for commercial sponsorship.

Museums have to focus on the target area of visitors. Visitors may be of different

heterogeneous categories based on age, occupation, place of residence, educational background, economic and social background, motivation level as well as special visitors. If we consider the age of museum visitors we can classify them into several groups such as -

- Children (below 5 years)
- Children (below 10 years)
- Children (below 18 years)
- Adults (18 years and above)
- Senior citizens

If the facilities provided by a museum for this category is considered it would involve a variety of facilities, programmes and activities for the different age groups.

Children below five years would need some place to sit, participate in some interesting activities, observe the objects and move around the museum with some freedom. They enjoy audio visual activities. Children below ten years have more curiosity about history, geography, science and arts. They would enjoy activities like story telling, quiz, demonstrations, worksheets and like to move around in the museum. They enjoy video and audio visual activities.

Children below 18 years are aware of the historical perspective. They are enchanted by the museum objects if these are well displayed. Proper lighting and labels, charts, relevant maps, audio visual kiosks, animatronics, touch screens. Activities and games would also excite these children at the museum. Adults and senior citizens like more information about objects displayed in a gallery or museum. Take home sheets, handouts, folders, brochures and some other interesting publications can be very appealing to adult visitors.

Cafeteria, rest room, cloak room, clean toilets, seating arrangement in corridors, drinking water facilities, are important requisites for a successful museum. Lighting in a gallery or museum should be of comfortable level to the visitors so that they find ease in seeing the objects on display, at the same time lights used should not be harmful to the objects. If museums have to bring about social change they must harp on these critical issues.

If visitors are classified according to their educational background they can be divided into:

- Preschool students
- Primary school students
- Secondary school students
- College and university students
- Research scholars
- Experts in different fields
- School teachers

- College teachers
- University teachers
- Visitors educated up to the school level
- Visitors educated up to the college level
- School dropout visitors
- College drop out visitors
- Unlettered visitors
- Semi -lettered visitors.

To deal with visitors of different educational background the museum has to focus on some vital aspects of orientation programme in the form of an audio visual presentation before the visit so that school children, school and college teachers college students and general visitors are acquainted with the type of collections they are about to see. A special audio visual room, library, seating arrangements, clean toilets, cafeteria are some of the requisites of these visitors. Unlettered visitors, semi-lettered visitors need visual and audio presentations to get a feel about the museum objects prior to their viewing the objects. Seating arrangements, drinking water, cloak room and clean toilets are to be ensured by the museum Primary and secondary school students would really enjoy an audio-visual presentation showing the important objects on display in the museum. Publications such as folders, picture post cards, catalogues, brochures museum ticket are appealing to these visitors. Accurate labeling and proper lighting entices these visitors to the gallery or museum. Seating places, drinking water, library, canteen are some of the needs of these visitors.

If visitors are to be classified on the basis of their social background we find:

- Visitors from a family or groups of families together.
- A group of tourists
- Visitors from a school
- Visitors from a college or department
- Group of friends as museum visitors.
- A lone visitor
- A couple as visitors.
- Visitor groups from an institution.

All objects have to be well interpreted giving opportunity for these visitors to gain knowledge and interest:

- The economic background classifies visitors into
- Visitors from lower income group
- Visitors from middle income group
- Visitors from affluent background

On the basis of motivation level visitors may be classified into:

- Aesthetic visitors - they are attracted by the aesthetic value of the museum objects
- Intellectual visitors - are interested in the knowledge behind the museum objects
- Creative visitors - appreciate the museum objects with a sense of curiosity.
- Contemplative visitors - like to imagine and think about museum objects in their own way and form their own concepts.
- Experimental visitors - are eager to touch and feel replica exhibits to get a feel of museum objects.
- Leisure driven visitors - like to spend some quality time at the museum to know and enjoy.

Special museum visitors can be classified into:

- Physically impaired: They need lifts, wheelchairs and ramps at the correct gradient as museum facilities. Doors should be wide to make easy entry and exit from the galleries and museum. Toilets should be specially designed for disabled visitors, Seating arrangement for visitors at different heights are required in a museum to cater to visitors.
- Mentally impaired: They need proper guidance and participative activity in the museum. They can also use replica tactile exhibits.
- Visually impaired: Braille systems should be made available for these visitors at hand reach. Tactile exhibits, touch and feel activities and workshops as well as audio lectures should be organized by the museum.
- Hearing impaired: Proper visual symbols and signage should be provided for these visitors at the museum. Visual presentations may be shown to these visitors related to the exhibits in the museum.

Besides these there may be partially physically impaired, partially hearing impaired visitors or partially visually impaired visitors whose needs are to be looked into in a museum. Only if all these facilities can be provided by a museum then social change can actually take place.

For visitors of different categories mentioned earlier as well as those from the social and economic background, special visitors and visitors based on different motivational level the priority would be on the display and presentation of museum objects, their interpretation and communication techniques in museums in order to bring about social change in a big way. It is not only important to attract visitors to the museums but also to provoke them to gather experience from the museums and bring about social change in the long run.

Museums are of different types in India ranging from archeological,

anthropological, ethnographical, geological, botanical, history museums, art museums, personalia museums, science museums, biographical museums, natural history museums, postal museums, eco-museums, general multipurpose museums and several others. Every museum has its own governing body who decide the mission statement and purpose of the museum. Museum presentations and displays involve a number of different factors such as display cases clear and lucid labels, presentation techniques which include two dimensional graphical aids like charts, maps, photographs plans, proper lighting arrangements, conducive temperature and humidity levels. The colour of the walls and the colour of the floors must be in contrast so that the objects can be viewed with ease.

Regarding display showcases it must be ensured that they have tight fitting doors and well sealed joints. Showcases must have solid legs to prevent vibration. They have to be made of material which do not damage objects such as types of wood, cardboard, paints etc

Museums have great responsibility towards the people At the same time they have to raise funds for the museum by organizing various services such as activities, workshops, film shows and selling their publications at the museum shop. Heritage education has to be linked with marketing to get the best out to bring about social change in the future.

Some services to be provided for encouragement of visitors to the museum to promote sustainable heritage tourism and bring about social change such as-

- Film or video programmes
- Touring exhibitions from the museum
- Music clubs for visitors
- Family workshops in art or science
- Fieldwork activities with museum volunteers.
- Recording of oral history
- Photographic recordings
- Arts festival
- Dramatic activities
- Workshops for children.
- Workshops for children with special needs
- Heritage walks to old monuments
- Tourism fairs to promote sustainable heritage tourism
- Children's' activities and programmes
- Museum games
- Hobby clubs
- Workshops for adults

- Demonstrations and lectures on heritage preservation
- Workshop on preventive conservation of coins, artifacts, books and paintings for general visitors
- Special lectures for disabled visitors .
- Temporary exhibitions on various areas of heritage awareness
- Exhibitions on intangible cultural heritage and their preservation.

Bibliography

Hooper-Greenhill, Museum and their visitors, Routledge , London, 1994

Banerjee N.R, Museums and cultural heritage in India, Agam kala Prakashan, New Delhi, 1990

Knell, Simon, Museums in the material world, Routledge, London, 2007

Watson, Sheila, Museums and their communities, Routledge, London, 2006

Witcomb, Andrea, Reimagining the museum, Routledge, London, 2003 Several other websites and journals were also referred to while writing this article..

Preservation of art objects on paper using aroma of natural plants and plant products against biological organisms

ANINDITA KUNDU SAHA

Since the prehistoric periods museums, libraries and archives are the repositories of most of the priceless collection including different kinds of art objects on paper. Through the centuries humankind has diligently recorded its efforts to perpetuate the inquisitive spirit, fortify history and culture, and illuminate the paths of future generations. Art objects on paper of different kinds have played a very prominent role in the development of cultures. They have helped not only in preservation of the history and culture of mankind, but also influenced the script, language as well as people's mode of thinking.

The history of preservation of art objects on paper was started about five thousand years ago. According to historical evidences preservation of archival records was attempted for the first time in China since the invention of paper making (105 B.C.). Preservation has allowed keeping records of almost all the unfolding history of human civilization.

In case of art objects on paper, preservation can be defined as those activities deployed to slow down or even prevent ongoing deterioration of the collection. It deals with minimizing deteriorating factors and maximizing proper handling and security of the collection.

Preventive care is an ongoing continues process and is the first step of object care supplemented by conservation treatment. The primary method of controlling biodeterioration of art objects on paper is through prevention. This involves several considerations. Reducing the opportunities and resources for the pest to invade and thrive are the fundamental task of prevention.

The preservation of art objects is gradually becoming more and more technology oriented and gradually shifting from our inherited natural methods to the world of synthetic chemicals by deploying more and more funds, infrastructure etc. The problem of preservation of art objects however still persists. Today a wide variety of chemicals which are relatively drastic and toxic have been used to combat biological attack on cultural heritage. Much reliance on the use of these synthetic chemicals has to some extent crimped the progress of our indigenous traditional ways of protecting our cultural property including art objects on paper. The use of synthetic pesticides causes problems of environmental pollution and other

undesirable side effects. The evidence of traditional use of herbs and other natural products effectively in the past against the activity of bio-organisms has been found profusely in the history of preservation of cultural heritage.

Natural products which could be used for preservation of art objects on paper are apparently non-toxic to environment as well as human beings. So the viable alternative to the present day hazardous chemicals can be the natural organic substances. Therefore, it is a need of the hour to explore the possibilities of using the plant origin pesticides to preserve our cultural heritage.

There are some advantages of using indigenous methods for preservation of art objects on paper:

- ▶ These are not hazardous for human health.
- ▶ These do not have any adverse effect on materials.
- ▶ These methods do not require much expertise, equipment and financial assistance.
- ▶ Materials used in these methods are more or less available in the context of the surrounding climate.
- ▶ Resistance to these compounds are not developed as quickly as with synthetic insecticides.
- ▶ Most of these compounds are not very expensive.
- ▶ People are familiar with the indigenous materials because they use them in the day to day activities.

There are evidences of thousands of essential oil bearing aromatic plants which can be harnessed as effective insect repellents. Out of 1500 aromatic plants found across the globe, about 1000 of them are found to be flourishing in India, either breeder or in wild state. Their efficacy as insect repellent is proved beyond an iota of doubt.

The main property of natural products of plant origin responsible for eradication of biological organism is the aroma they possess. Essential oil which are complex mixture of natural substances such as ketone, terpen, ester, alcohol, aldehyde are extracted from different plant parts like flowers, leaves, seeds, barks, fruits, roots, rhizomes etc., can be used as pesticides either to repel or kill certain biological organisms. Powdered form of various plant products can also be used for the same purpose. These plant materials enter the body of biological organisms by inhalation, absorption or consumption.

The properties of ideal insecticidal plant must include the followings:

- ▶ The plant should be perennial.
- ▶ The plant should have wide distribution and be present in large number in nature.

- ▶ The plant parts used as pesticides should be removable.
- ▶ It is essential to avoid the use of roots and barks during harvesting of plant.
- ▶ For the growth of plants should require small space, little water, fertilizer and less management.
- ▶ The plant should have additional use (for example medicinal use).
- ▶ The active ingredients should be effective at low rates.

Following natural products of plant origin have proved the potentiality for protecting different kinds of art objects on paper from biological attack:

Neem (Margosa) (Azadirachta indica A. Juss)

The *neem* tree belongs to the family *Maliaceae*. All parts of this tree like leaves, bark, seeds, fruits, flowers are bitter in taste and have the insecticidal property. There are more than 25 active compounds found in *neem*. The insecticidal property of *neem* trees depends on the presence of two active ingredients- *azadirachtin* and *salannin*. *Azadirachtin* acts as an insect feeding deterrent and growth regulator. The treated insect usually cannot moult to its next life stage and dies. It has low mammalian toxicity and does not cause skin irritation in most formulations. The greater concentration of active ingredients is found in the *karnel* of its seed. Insects will have a great difficulty of developing immunity against all such active ingredients of this plant.

Dried *neem* leaves can be used as insect repellent. Leaves should be dried under shades because the active ingredients biodegrade rapidly under sunlight. Dried leaves can be kept inside the storage boxes and also in between folios of manuscripts, books, records etc., to repel insects effectively. Burning of this dried leaves give off odour that is fatal to insects. Dried *neem* leaves also act as buffer for maintaining normal humidity inside the storage box.

Neem oil is extracted from the seeds of the tropical *neem* tree is acrid and bitter in taste and contains sulphur. It has two crystalline bitter compounds- *nimbin* and *nimbinin* and amorphous bitter compound *nimbidin*. This oil is active against 400 insect species. Active ingredients of *neem* oil act as anti-feedants or growth regulators in insects; inhibit secretion of hormone, the moulting and reproductive function of insects.

Neem seed oil and leaf extracts can also be used to prevent fungal infestation. *Neem* based powder and *neem* smokes can be used to make an area dry and to kill fungus. The compounds *gedinin* and *nimbidol* found in *neem* leaves control several fungi.

Ashwagandha (Withania somnifera (L.) Dunal)

It grows as a stout shrub that belongs to *Solanaceae* family. The main constituents of *ashwagandha* are alkaloids and steroidal lactones. Dried and powdered leaves

of *ashwagandha* in small pillow packs can be kept inside the display and storage cabinets where art objects on paper are kept as insect repellent.

Tulsi leaf (*Ocimum Sanctum* L.)

Tulsi is an erect sweet-scented pubescent herb, belongs to *Lamiaceae* family. The active compounds isolated from *tulsi* leave include *ursolic acid*, *apigenin* and *luteolin*. Essential oil of *tulsi* has antibacterial, antifungal and antiviral properties. One of the major constituents of the leaves, *ursolic acid* has been reported to possess antifertility activity in rats and mice due to its antiestrogenic effect which is responsible for arrest of spermatogenesis in males and inhibitory effect on implantation of ovum in females. Besides, dried leaves can be kept between the folios of manuscript, paintings, books, records etc., as insect repellent.

Oxalis leaf

These plants are annual or perennial, belong to *Oxalidaceae* family. Raw leaves are burnt very slowly without producing much flame and the smoke coming out of acts as preservative which makes the art objects on paper free from insect attack more than ten years if smoke is introduced in the manuscripts once. This process should be repeated after ten to eleven years.

Pyrethrum (*Chrysanthemum cinerariaefolium*)

This plant contains several active ingredients that are toxic to insects. Insecticidal property of this plant lies in the flowers. *Pyrethrin* is the active ingredient of this plant which is the mixture of six constituents- *Pyrethrin I*, *Pyrethrin II*, *Cinerin I*, *Cinerin II*, *Jasmoline I* and *Jasmoline II*. *Pyrethrins* are ester which can be extracted with the solvents from flowers and stem. Most insects are highly susceptible to low concentrations of *pyrethrins*. The toxins act on the central and peripheral nervous system of insects causing repetitive discharges, followed by convulsion, paralysis and death. To produce insect repellent sticks and coils ground powders from dried pyrethrum flowers or extracts obtained from them are used. Smokes generated due to burning of these sticks or coils are irritating and cause the insects to stop feeding as soon as they encounter a treated area. Pyrethrum also acts as contact poison. It can also be used as insect repellent effectively and forces the insects to come out of their hiding places. It is highly unstable in light, moisture and air and it has low mammalian toxicity.

Tobacco (*Nicotiana tabacum* L.)

Nicotine, the active ingredient of tobacco leaves is a non-persistent contact poison. It is found in the tobacco leaves. in the form of *maleates* and *citrates*. Nicotine is an alkaloid and commercially prepared by the steam distillation of waste of tobacco in presence of alkali. It produces a disagreeable smell on exposure to air. It is a fast-acting nerve toxin and is highly toxic to mammals. After penetrating into the body of

insects it produces new nerve impulse which causes convulsion and death. The dried tobacco leaves packed in pieces of de-starched, acid free cotton cloths or cloth bags can be kept inside the storage boxes as well as display showcases of art objects on paper act as active insect repellents. Fresh or improperly dried tobacco leaves should not be used in storage or display cases as repellents, because they produce brown stains in direct contact with the objects due to presence of tannin.

Turmeric (*Curcuma longa* L.)

Turmeric is commonly known as *haldi* which is root of perennial shrub belongs to *Zingiberaceae* family. The essential oil of turmeric contains a variety of *sesquiterpenes*. The insect repellent property of turmeric depends on its aroma. The active ingredients of aroma are *turmerone* (maximum 30%), *arturmerone* (25%) and *zingiberene* (25%). *Curcumin* is the chief constituent of turmeric imparts yellow colour. It has insect repellent property.

Ginger (*Zingiber officinale* Roscoe)

Ginger roots and stems can be used as pesticides against certain insects and fungal spores. It belongs to *Zingiberaceae* family. The characteristic aroma of ginger on which the pesticidal property depends contains 1 to 3% of volatile oil, is obtained by steam distillation of roots and stems of ginger. This volatile oil is also capable of inhibiting the growth of bacteria in closed chamber.

Sweet flag (*Acorus calamus* L.)

Sweet flag is commonly known as *Ghor bach* which is a semi-aquatic perennial herb. It is a plant from the *Acoraceae* family. Both leaves and rhizomes of this plant are psychoactive due to the presence of active compound *asarone*. Dried rhizomes of this herb have a mellow odour and contain 1.5 to 3.5% of a yellow, aromatic volatile oil. Dried rhizomes or powder of rhizomes packed inside pieces of starch free, acid free cotton cloth or sachets can be used to repel insects in the repositories have art objects on paper. It can also be used as fungicide.

Sweet basil (*Ocimum basilicum* L.)

Basil is a tender low-growing herb, belongs to *Lamiaceae* family. The leaves of basil can be used as insecticide. The dried leaves of basil contain 0.20-1 % essential oil. The major compounds in the oil are *linalool* and *methylchaviol*. Dried leaves can be kept inside the folios or pages of books, manuscripts, records as they act as insect repellent due to their strong, pungent, sweet smell.

Adhatoda (*Adhatoda vasica* L.)

It is a shrub, belongs to *Acanthaceae* family. The dried powdered leaves of this plant have insect repellent properties due to presence of two major alkaloids called

vasicine, and *vasicinone* and can be used in art objects preservation effectively.

Ivy gourd (*Coccinia grandis* L.)

Ivy gourd is a tropical plant in the *Cucurbitaceae* family. Dried leaves of ivy gourd have insect repellent property and can be used for preventive conservation of art objects on paper.

Bark of Arjun (*Terminalia arjuna*)

It is a large size deciduous tree, belongs to the family *Combretaceae*. Its bark contains rotenone which possesses insecticidal and insect-repellent properties. Dried or powdered bark kept in small pillow can be used in storage and display cabinet where different art objects on paper are kept.

Rotenone

Rotenone is a *flavonoid* extract of roots of two tropical legumes- *Derris sp.* and *Lonchocarpus sp.* The active ingredient of rotenone is *rotenoid* on which the insecticidal property of rotenone depends. It acts as an insect repellent as well as contact and stomach poison. When insects are poisoned with rotenone, it inhibits metabolism of insects and causes a drop in oxygen consumption, respiratory depression and ataxia leading to convulsion and finally paralysis and death by arresting respiratory organs. Rotenone has little toxic effect on human. But the extract obtained from rotenone is not very safe as it causes nerve damage to human beings and other warm blooded animals. Rotenone degrades rapidly when exposed to air and sunlight.

Sitaphal (Custard apple) (*Annona squamosa* L.)

This plant belongs to *Annonaceae* family. The seeds and leaves of custard apple have the insecticidal properties. So, powdered seeds of custard apple can be used to eradicate insects that thrive on art objects on paper.

Lemon (*Citrus limon* L.) Burm.fJ

This plant belongs to *Rutaceae* family. Lemon oil can be used as a non-toxic insecticide treatment; because it contains *d-limonene*.

Downy thorn-apple (*Datura metel* L.)

It is a shrub-like annual herb, belongs to *Solanaceae* family. The leaves or juice of it acts as stomach poison as it contains *tropane* alkaloids which is highly toxic in nature.

Black pepper (*Piper nigrum* L.)

Black pepper is a flowering vine in the family *Piperaceae*. It is produced from the still-green unripe berries of the pepper plant. Black pepper is also known as *gol mirchi*, the fruit of which contains about 3% essential oil. Aroma of black pepper

contains *monoterpene hydrocarbon*. About 20% *sesquiterpene* and traces of *phenylether* are found in essential oil of black pepper. The active ingredient of aroma responsible for eradicating insects is terpenes which includes *sabinene*, *caryophyllene*, *linalool*, *alpha-phellandrene*, *limonene*, *myrcene* and *alpha-pinene*. Powdered fruits of black pepper alone or mixed with other natural plant products kept in cotton cloth or sachet can be used as insect repellent in storage and display showcases where art objects on paper are kept. It can also be used as contact poison as *limonene* and *linalool*, two active ingredients of black pepper acts as nerve toxin.

Black cumin (*Nigella sativa* L.)

This plant belongs to *Ranunculaceae* family. It has a pungent bitter taste and a faint smell of strawberries. It is also known as *kala jira*, whose seeds contain 0.5 to 1-4% essential oil. This volatile oil gives a strong aromatic smell. The important constituent of black cumin is toxic glycoside *melanthin*. Powdered black cumin seeds alone or mixed with other natural products such as camphor kept in sachet or pieces of cotton clothes or scattered seeds at the display and storage cabinet of art objects on paper act as active insect repellent.

Clove [*Syzygium aromaticum* (L.) Merrill & Perry]

Cloves are the aromatic dried flower buds of a tree in the family *Myrtaceae*. Clove also contains aromatic volatile oil which has the insect repellent properties. Its main active ingredient is *eugenol*. Powdered clove alone or mixed with other natural plant products or clove oil can be used to repel insects that thrive on art objects on paper.

Garlic (*Allium sativum* L.)

Garlic is a species in the onion family *Alliaceae*. Garlic exhibits anti-bacterial, anti-fungal and insect repellent properties. Garlic oil kills insect pests. Garlic oil mixed with *neem* oil acts as very effective insecticide.

Ajowan (*Trachyspermum ammi*)

The active ingredient of essential oil of *ajowan* is *thymol* which is derived from fruit of *Carum coticum* belongs to *Umbelliferae* family. So, the powdered *ajowan* can be used as effective fungicide as well as insecticide.

Karanja (*Pongamia glabra* Vent.)

Seeds of *karanja* contain dark coloured oil which is bitter in taste. This oil contains toxic flavonoid which includes *karanjin* and *pongamol* alkaloid. This oil possesses insecticidal, antifeedant and anti-bacterial properties. *Karanja* oil mixed with *neem* oil can be used as an effective insecticide.

Cinnamon bark (*Cinnamomum zeylanicum*)

The cinnamon tree belongs to the family *Lauraceae*. The flavour of this bark is due to presence of an aromatic essential oil that makes up 0.5% to 1% of its composition. This oil is prepared by roughly pounding the bark, macerating it in seawater, and then quickly distilling the whole. It is of a golden-yellow colour, with the characteristic odour of cinnamon and a very hot aromatic taste. The pungent taste and scent come from *cinnamic aldehyde* or *cinnamaldehyde*. Cinnamon bark has the anti-bacterial and anti-fungal properties. The active ingredients of essential oil of cinnamon bark are *ethyl cinnamate*, *eugenol*, *cinnamaldehyde*, *beta-caryophyllene*, *linalool*, and *methyl chavicol*. Cinnamon leaf oil also possesses anti-fungal property, but it is less sensitive than bark oil. Cinnamon oil mixed with clove oil can be used effectively to check fungal infestation on art objects on paper.

Sandalwood (*Santalum album* L.)

Sandalwood, also known as *chandan* is hemiparasitic trees of the *Santalaceae* family. The essential oil of sandalwood is extracted from heartwood by distillation. The active ingredients of sandalwood are alpha and beta *santalols*, *santalal*, *santalone*, *santene* etc., which affect the hormonal activity of insects, thus disturbing the psychological process of developing insect larvae. Sandalwood dust acts as an insect repellent. It also acts as a humidity buffer.

Cedar wood (*Cedrus* sp.)

The name cedar is applied to coniferous tree with fragrant wood. These trees belong to *Pinaceae* family. Because of its insect repelling aroma cedar wood oil extracted by distillation from wood of *Cedrus doedara*, *Cedrus atlantica* can be used to ward off moth and certain other insects that cause damage to art objects on paper.

Wormwood (*Artemisia absinthium* L.)

It is a perennial aromatic herb with wine flavour, belongs to *Asteraceae* family. This species contains highly potent spirit *absinthe* which is an excellent deterrent to fleas and moths. For making insect spray two best varieties of wormwood-Silver King and Powis Castle can be used. Sliver Mound is the most toxic wormwood.

Agarwood (*Aquilaria agallocha* Roxb.)

This plant belongs to the family *Thymelaeaceae*. Dried bark or wood of this plant possesses insect repellent property because of presence of active ingredient *Agarol*.

Citronella oil

Citronella oil is one of the essential oils derived from leaves and stems of dried cultivated grasses-*Cymbopogon nardus* and *Cymbopogon winterianus*, found in Asia, belong to the *Poaceae* family. The active ingredients of this oil consist of

geraniol, limonene, methyl isoeugenol, citronellol, geranyl acetate and citronella. This oil possesses active insect repellent property. Because of its highly volatile nature its effect lasts only about an hour. Its effectiveness as an insect repellent can be increased by mixing other volatile repellents with animal fat or oil to reduce the rate of evaporation, Citronella oil has strong antifungal properties.

Camphor

Camphor is a white crystalline substance, obtained from the tree *Cinnamomum camphora* which belong to *Dipterocarpaceae* family. Camphor comes only from two trees-*Cinnamomum camphora* and *Dryobalanops camphora*. Camphor is formed in the oil cells found all parts of the tree. A yellow coloured camphor oil exudes in the process of extracting camphor. Chips of the wood of *Cinnamomum camphora* is boiled in water and the vapours are cooled to yield a white crystalline substance i.e. camphor. Camphor crystals are found naturally in the stems of *Dryobalanops camphora*. The important constituents of camphor are *alpha-pinene, cineol, terpineol* etc.

Crystalline camphor packed in cotton cloth or sachets can be kept inside the storage as well as the display cabinets where art objects on paper are kept to repel insects.

Eucalyptus oil

Eucalyptus oil is derived from steam distillation of leaves of *Eucalyptus occidentalis* Skeels, which belongs to *Myrtaceae* family. The oil imparts an aromatic smell. This oil can be used to check fungal infestation of art objects on paper.

Lemon grass oil

Lemon grass (*Cymbopogon citratus*) is a tall tropical grass belongs to *Poaceae* family. The fresh stalks and leaves have a clean lemon like odour, because they contain an essential oil which is also present in lemon peel. The contents of this oil vary with the age of the grass. This oil is sherry coloured with a pungent taste and lemon-like odour and contains *citral* as the principal constituent. This oil has an antifungal property.

Cotton seed oil

Cottonseed oil is a vegetable oil extracted from the seeds of the cotton plant (*Gossypium arboreum* L.) after the cotton lint has been removed. This plant belongs to *Malvaceae* family. The active compound on which the insecticidal property of this oil depends is *gossypol*.

Canola oil

Canola oil is an edible vegetable oil obtained from the seeds of rapeseed plants-*Brassica napus* and *Brassica campestris* belong to *Cruciferae* family. This oil can also be used to control insects affecting of art objects on paper. It has no adverse effect on human as well as on environment.

Cashew-nut oil

This oil is obtained from the fruits of *Anacardium occidentale* L. belongs to *Anacardiaceae* family. It is brown in colour and has an extremely blistering effect on the skin. The chief constituents of the oil in the shells are *anacardiac acid*, *orthohydroxy benzoic acid* and *cardol*. This oil can be used as insecticide as well as fungicide also.

Nirgundi (*Vitex negundo* L.)

It is a deciduous shrub belongs to *Verbenaceae* family. Dried leaves of this shrub contain alkaloids like *iridoidglycosides-nishindaside* and *negundoside* on which its insect repellent property depends. Leaves of this shrub are dried in sun. Dried leaves and the bark of this shrub can also be used to repel insects.

Sabadilla

This compound is obtained from the ripe seeds of *Schoenocaulon officinale* belongs to *Liliaceae* family. The alkaloids in *sabadilla* affect insect nerve cells, causing loss of nerve function, paralysis, and death. The dust formulation of *sabadilla* is the least toxic of all registered botanical insecticides. However, pure alkaloid extracts are very toxic if swallowed or absorbed through the skin and mucous membranes. The ground seeds of the plant can be used as insecticide with lowest mammalian activity. It breaks down rapidly in sunlight and air, leaving no harmful residues.

Sabadilla is a broad-spectrum contact poison, but has some activity as a stomach poison. It can be used as baits, dusts or sprays.

Larkspur

Larkspur is a plant of *Consolida* genus. *Consolida* is a genus of about 40 species of annual flowering plants belongs to *Ranunculaceae* family. Some species of this genus contains poisonous alkaloids such as *aconitine* on which its anti-parasitic and insecticidal properties depend.

Ryania

Ryania is a botanical insecticide extracted from the ground stems of *Ryania speciosa* belongs to *Flacourtiaceae* family. The principle alkaloid in this stem extract is *ryanodine* which makes up 0.16-0.2% of the product. It is a stomach poison, causes insects to stop feeding soon after ingestion and makes the insects inactive for long time before death and is highly toxic to the moths. *Ryania* has a very low toxicity to mammals. *Ryania* has longer residual activity than most other botanical insecticides.

Catnip

The genus *Nepeta* has about 250 flowering perennial herb belongs to mint (*Lamiaceae*) family. The members of this group are known as catnip. The main

active ingredient of catnip is *nepetalactone*. It deters beetles, ants and repels mice quite well. Sprigs of mint spread around the building of the repository can deter mice and ant.

Mint (*Mentha arvensis*-L.)

Mint is commonly known as *pudina* belongs to *Lamiaceae* family. The active ingredient of this plant is *transpulegol* on which its insect repellent property depends. It causes irritation to ants and cockroaches.

Red squill

It is obtained from the bulbs of red variety of *Urginea maritima*, a native Mediterranean species. The toxic ingredient of this bulb is glucoside which has little effect on human beings. A powder prepared from the bulbs of the red squill can be used as a rat poison.

Yarrow (*Achillea millefolium*)

Yarrow is a perennial herb, belongs to *Asteraceae* family. It contains *isovaleric acid*, *salicylic acid*, *asparagin*, *sterols*, *flavonoids*, *bitters*, *tannins*, and *coumarins*. It also has insect repelling property.

Mixed natural product

A mixture of following products in dust form along with 25 grams of camphor can be used as an insect repellent-

Black cumin -	1 part
Sweet flag -	1 part
Clove -	1/4 part
Pepper -	1/4 part
Bark of cinnamon -	1 part

All the above mentioned ingredients are dried in the shade and pulverized separately, one at a time. Each powdered ingredient is then put together and mixed thoroughly. 5 gm of this mixture packed into small sachets can be used in the display and storage cabinets as well as between the bundles, pages or folios of art objects on paper as an insect repellent. The effectiveness of this mixture lasts for six months, after which it has to be replaced with the freshly prepared mixture.

There are large numbers of plants bearing insecticidal/insect repellent properties that are given below:

List of plants bearing insecticidal / insect repellent properties

Sr. No.	Name of the Plant	Vernacular Names	Effective for the Pest Species
1.	<i>Acorus calamus</i> Linn.	Bach	Firebrat (<i>Thermobia domestica</i>), Leather / Hide beetle (<i>Dermestes maculatus</i> , <i>Dermestes vulpinus</i>), Rat and mice (General)
2.	<i>Annona squamosa</i> Linn.	Sitaphal / Custard apple	Webbing Cloth moth (<i>Tineola bisselleillai</i> , Carpet beetle (<i>Attagenus piceus</i>)
3.	<i>Ananas comosus</i> (L.) Merr.	Anannus / Pineapple	Oriental Cockroach (<i>Blattella orientalis</i>)
4.	<i>Anacardium occidentale</i> Linn.	Kaju	Powder post beetle (<i>Lyctus brunneus</i>), Termites (General)
5.	<i>Andropogon nardus</i> Linn.	Ganjini	Cockroach (General)
6.	<i>Artemisia absinthium</i> Linn.	Wormwood	Cockroach (General), Cloth moth (<i>Tinea granella</i>)
7.	<i>Artemisia nilagirica</i> Linn.	Dauna / Davana / Nagdona	Case bearing cloth beetle (<i>Tinea pellionella</i>)
8.	<i>Artemisia vulgaris</i> Linn.	Dona / Mugwort / Jack	Carpet beetle (<i>Attagenus gloriosaei</i>)
9.	<i>Azadirachta indica</i> A. Juss	Neem	Furniture / Carpet beetle, Cockroach (General), Book worm beetle (<i>Gastrallus indicus</i>)
10.	<i>Calotropis procera</i> Rbr.	Mudar / Roostertree / Akunda	Black carpet beetle (<i>Attagenus piceus</i>)
11.	<i>Cassia fistula</i> Linn.	Amaltas / Golden Shower	Eastern Subterranean Termite (<i>Reticulitermes flavipes</i>)
12.	<i>Chrysanthemum cinerariaefolium</i> Vis.	Pyrethrum	Cockroach (General), Firebrat (<i>Thermobia domestica</i>)
13.	<i>Cinnamomum camphora</i> (Linn.) Sieb.	Karpoor / Camphor	Cloth moth (General), Book worm beetle (<i>Gastrallus indicus</i>)

14.	<i>Cinchona</i> sp. Linn.	Quinine	Cloth moth (General)
15.	<i>Citrus limon</i> (Linn.) Burm.f	Neebu	German Cockroach (<i>Blattela germanica</i>)
16.	<i>Cymbopogon nardus</i>	Citronella oil	Cockroach (General)
17.	<i>Delphinium grandiflorum</i> Linn.	Forking / Blue butterfly / Larkspur	Cockroach (General)
18.	<i>Digitalis lanata</i> Ehrh.	Grecian Foxglove	Eastern Subterranean Termite (<i>Reticulitermes flavipes</i>)
19.	<i>Eclipta alba</i> (Linn.) Hassk.	False Daisy / Bhringraj / Bhangra	Black carpet beetle (<i>Attagenus</i> <i>piceus</i>)
20.	<i>Ginkgo biloba</i> Linn.	Maidenhair tree	Silverfish (<i>Lepisma saccharina</i>)
21.	<i>Maesa indica</i> Wall	Metabimbiya	Webbing Cloth beetle (<i>Tineola bisselleilla</i>)
22.	<i>Melia azadirachta</i> Linn.	Bakayan	Black carpet beetle (<i>Attagenus</i> <i>piceus</i>), Cockroach and Crickets (General), Webbing Cloth beetle (<i>Tineola bisselleilla</i>), Termites (General)
23.	<i>Mentha arvensis</i> Linn.	Pudina	Rats and Mice, Cockroaches (General)
24.	<i>Nicotiana tabacum</i> Linn.	Tamakhu	Eastern Subterranean Termite (<i>Reticulitermes flavipes</i>)
25.	<i>Nigella sativa</i> Linn.	Kalajira	Cloth moth (General and <i>Tinea</i> <i>granella</i>), Crickets (General)
26.	<i>Quassia indica</i> Linn.	Rangoon ki bel	Termites (General)
27.	Rotenone	Hajari	German Cockroach (<i>Blattela</i> <i>germanica</i>), Firebrat (<i>Thermobia</i> <i>domestica</i>), Cloth moth (<i>Tinea</i> <i>granella</i>)
28.	<i>Santalum album</i> Linn.	Sandal	Oriental Cockroach (<i>Blatta</i> <i>orientalis</i>), Termites (General)

29.	<i>Samadera indica</i> Gaertn.	<i>Loknandi</i>	Termites (General), Black carpet beetle (<i>Attagenus piceus</i>)
30.	<i>Saussurea lappa</i> Clarke	<i>Kuth</i> / Saw-wort / Snow lotus	Crickets (General)
31.	<i>Terminalia arjuna</i> Weight and Arnott	<i>Arjun</i>	Rats and Mice (General)
32.	<i>Veliveria zizanoides</i> Linn.	<i>Khus</i> / Kuss-Kuss grass	Cloth moth (General)
33.	<i>Vitex negundo</i> Linn.	<i>Nirgundi</i> / Nisinda	Cloth moth (General)

Though our natural products of plant origin are not always sufficient to eradicate biological growth and infestation, they should not be dismissed in favour of other synthetic materials. Application of our traditional preservation methods could be encouraged for the preservation of different art objects on paper as they can be the alternative means to safeguard our heritage for posterity.

Reference

Gupta, CB. & Haider, H.e. "A reappraisal of natural organic pesticides and pest repellents of plant origin". *Studies on Biodeterioration of Materials-I*, N.R.L.C., Lucknow, 2000, pp. 107-114.

Gupta, KK "An introduction to the traditional practices for the control of bio-deterioration of manuscripts". *Indigenous Methods and Manuscript Preservation*, National Mission for Manuscripts, Delhi, 2007, (Samraksika series; 1), pp. 35-57.

Maiti, Sanjay Kumar. "Our conventional chemical book protectants against insects". *Conservation of Archival Material*, West Bengal Teachers' Association, 2000, pp. 172- 175; 176-178.

Mukherji, K.G., Garg, KL. and Mishra, A.K "Fungi in deterioration of museum objects". *Biodeterioration of Cultural Property-3*, Bangkok, 1995, pp. 230-233.

Mukherjee, Kalyan Kumar, and Guha, Parth Subir. "Various poisonous chemicals used for conservation job". *Library Conservation*, Information Research Academy, Calcutta, 1990, pp. 145-154.

Effect of fungi as biodeteriogen on museum objects

TANUSHREE CHAKRABORTY

Introduction

Deterioration of material is a natural and inescapable phenomenon of the universe. Both organic and inorganic matter is perishable in due course of time and space. So, preservation of cultural properties in museum is a constant fight against natural process of destruction.

I. *Abiotic Factor:*

- A. Thermal degradation: Due to fluctuation of temperature from the ideal range 20° to 25° C and humidity 45% to 60%.
- B. Physical decay: Resulting cracking and splitting of wooden objects, fading of colours of paintings of different type, weakening of fibre of textile etc.
- C. U-V Radiations: Total damage of different type of museum objects mainly organic in nature. It reduces the strength and stability of objects, threatening their survival.
- D. Pollutants: All cultural materials both organic and inorganic are affected by atmospheric pollutants and are subjected to chemical phenomena of oxidation, reduction, hydrolysis etc.

II. *Biotic Factor:* The organic objects are mainly consist of cellulosic materials are the good source of food for biological agencies.

A. Plants:

- (i) Micro organisms: In tropical countries with warm and humid climate damage to the cultural properties caused by various types of micro organisms like bacteria, mold, algae, lichens and moss.
- (ii) Macro organisms: Brayophytes, pteridophytes, angiosperms are m this group. Generally these plants grow on surface of archaeological objects like monuments, sculptures etc. They degrade objects by biochemical and biophysical process.

B. Animals:

Insects, birds, chiroptera, rats and mice are within this group. Among them insects are the worst enemies of museum objects are- termite,

book lice, silver fish, wood- boring beetle etc. Droppings of insects, birds, rat etc stain the materials and encourage mold growth and ultimately deterioration. Rats and mice directly attack organic objects.

The extent of detrimental effect of these factors is more or less according to the nature, composition and strength of the objects. Among the various deteriorating agents of cultural properties microorganisms play a dominant role in deterioration of art objects. The microbiodeterioration is a serious threat to all organic objects like papers, manuscript, wood, textile, decorative art, paintings of various types. Among the microorganisms fungi play a very dominant role in destruction of museum objects. In India where the temperature and humidity is most suitable for fungal sporulation and infestation as they require very high relative humidity (more than 60%) for their germination. Considering the significant role of air borne fungal spores in deterioration of the work of art, paintings etc extensive air monitoring is needed. As the microbial flora of the indoor air depends on the number and the kind of organisms present and the mechanical movements within the enclosed space. (Tilak et al, 1984). There is a great necessity of assessing the air borne microspores of fungi and its role in biodegradation of our cultural heritage. Biodeterioration is an extensively different and new applied field in which the interaction among the substrate, the organism and the environment occurred (Tilak, 1989).

Biodeterioration of museum objects can be defined as '*any undesirable change in the structure and properties of materials caused by the vital activities of living organisms*' (Hueck, 1968; Nair, 2010). According to Dr. S.M Nair, most of the undesirable changes lead us to the study of biodeterioration.

Considering the significant role of aeromicroflora in deteriorious effects on the work of art, paintings, books, manuscripts etc fungi play a dominant role. Various aerobiological investigations have brought to light the effects of fungus on cultural properties. The degree of destructive effect of fungi on an object largely depends on the material composition of the object and the particular fungi that has affected it.

Fungi in Plant-kingdom

An understanding of the life cycle of various groups of fungi, their chemical secretion at different stages of life cycle, nature of destructive activities on different objects is the key to protect objects from fungal attack. The fungi are diverse group of living organisms devoid of chlorophyll pigment. There are approximately 69,000 species of fungi everywhere i.e. they are found in soil, water, air and even in plants and animal bodies. Airborne micro fungal spores are found large number in both indoor and outdoor environments widely in nature. They may be defined as chlorophyll-less, non-vascular and non-autophytic i.e. heterophytic members of Thallophyta (Bessey, 1950; Mitra et al, 2002). Mycologists have variously described fungi as eukaryotic, spore producing achlorophyllous organisms with absorptive nutrition.

According to Alexopoulos (1962), fungi are '*nucleated, spore-bearing, achlorophyllous organisms which generally reproduce sexually and asexually, and whose usually filamentous, branched somatic structure are typically surrounded by cell walls containing cellulose, or chitin or both*'.

Fungi are variously classified, but mainly there are four major groups:-

- Chytridiomycota (Water moulds, Allomyces etc)
- Zygomycota (Bread moulds)
- Ascomycota (Sac fungi)
- Basidiomycota (Mushroom, Rust, Smuts etc)

Myxomycetes (Slime moulds) are not true fungi. They lack hyphae and have an amoeboid stage as the principal part of the life cycle but are generally associated with fungal herbaria.

Bessey (1950) classified true fungi into four classes:-

1. Phycomycetes 2. Ascomycetes 3. Basidiomycetes 4. Fungi Imperfecti

Effect of fungi on museum objects

Among the microbiological agents, such as bacteria, fungi, actinomycetes, most severe deterioration in indoor objects of museums is primarily caused by fungi. Mainly ascomycetes and deuteromycetes (fungi imperfecti) most devastating towards organic objects of museums. The main components of organic objects are cellulose. The cellulolytic fungi produce different organic acids like oxalic, fumaric, citric etc and utilize cellulose for their nutrition resulting in loss of fibre strength and actual material failure. The complete degradation of cellulose is effected by two groups of cellulases - endoglucanases and exoglucanases that split off mono and disaccharide units from the non-reducing end of a cellulose chain and cause complete degradation of organic objects (Erikson and Petterson, 1975; Dhawan, 1986). The short cellulose fibres are degraded more easily than long fibers (Basu and Ghosh, 1962). Fungi not only degrade the organic objects, it also acts on inorganic matter like; stone and different metals. Citric and oxalic acid produced by species of *Botrytis*, *Mucor*, *Penicillium* and *Trichoderma* cause solubilization of stone objects. Even chelation of iron by *Penicillium* and *Acremonium* has also been observed in laboratory condition. In recent research shows the remarkable results on a fungus which cause wine red stains on paintings altered by chronic attacks as well as acute ones. (Agrawal, 1972). Deterioration of museum objects by fungal effect had always been of great concern to conservationist & several research works has been taken place in France, Italy, Japan, & the United States. But this field of research with particular reference to museum objects has not received adequate attention in India as well as in West Bengal.

Studies conducted by the researcher on the isolation, culture and identification of fungi from different museums and like institution in West Bengal showed the presence of the following fungi on different organic objects are:

Fungal genera	Susceptible substances
<i>Aspergillus</i> sp	Paper, miniature painting, herbarium, leather
<i>Alternaria</i> sp	Scroll painting, miniature painting, natural history specimens
<i>Penicillium</i> sp	Book binding, paper, botanical specimens like' cereals, pulses, nuts etc, textile
<i>Mucor</i> sp	Photographic plate, paper, leather
<i>Rhizopus</i> sp	Natural history specimens, paper, paintings
<i>Cladosporium</i> sp	All type of textile fibre
<i>Curvularia</i> sp	Textile of all kind, paper, book binding

Mention the condition of the museum objects due to fungal effects under separate headings.

An investigative work on effects of fungal flora on organic objects of museum at Bharat Kala Bhavan, Varanasi was done by Ram Samar Singh et al ("A Mycological Analysis of the Air in the Bharat Kala Bhavan"). According to them various fungi were isolated from Bharat Kala Bhavan where they play a prominent role in the complex biochemical transformation of organic object. These are: *Abisidia glauca* Hagem, *A. lichtheimii* (Lucet and Costantin) Lender, *A. scabra* Cocconi, *A. spinosa* Lendner, *Alternaria humicola* Oudenmans etc.

Control of biodeterioration caused by fungi

The nature & extent of deterioration brought about by different fungi, their exact identity, ecology, the effective lethal range of biocides required for their control have not been fully understood. The control of biodeteriogens is a specialized job and consists of three main activities; monitoring, prevention and adoption of remedial measures. Bisht (1987) has suggested four ways for eradication of biodeterioration:-

- Environmental control
- Chemical control which include use of chemicals as well as plant extracts
- Biological control and
- Radiological control

Environmental control

One of the most important factors that has major role in controlling the life span of the museum objects is environment where the objects are displayed, stored and used. Environmental control is important because inappropriate temperature, humidity and air pollution severely reduces the life span of objects. The greatest danger of organic objects comes from excessive humidity causing mold growth. The increase of museum humidity to 70% RH and higher and temperatures of more than 21°C may trigger spore germination and mould bloom within 24 hours (Nair, 1972; Agrawal, 1977; Dicus, 2000). Biological organisms are more destructive towards organic objects in warm & humid climate like Indian subcontinents. Normal standard for maintaining relative humidity in museum ranges between 45% to 55%. The optimum temperature required for museum collection ranges from 20°C to 25°C. Air pollution level inside the museum can be controlled by preventing entry of gaseous contaminants by using chemical filters, wet scrubbers or a combination of both. Various suspended particulate matter settled on art objects & attract moisture augment biodeterioration. According to Dr. G Kamalakar & Dr. V Pandit Rao, the safe level for industrial & mixed use zone is 500 micrograms/ cubic metre. In case of residential & sensitive zones the safe level is 200 & 100 micrograms/cubic metre respectively. But the suspended matter in Kolkata, West Bengal is 3000 micrograms / cubic metre. This spot study done by The Tamil Nadu Pollution Control Board.

In the tropical humid climate of West Bengal, biological agents are more destructive towards organic objects. A thorough fact finding, analytical study is required in this critical even unexplored area of fungal studies on museum objects in West Bengal. The negligence of environment control, proper cleaning and maintenance of the museum become the good source of the deteriorative and destructive effect of the mould that may cause serious threat to the museum objects. Certain corrective measures, proper maintenance, and controlling the temperature and humidity through air-conditioning which can reduce the frequency of mycological spore density in air and on objects. So the main aim is to find out the causal organisms which cause biodeterioration and by controlling them for preservation of the true nature of the cultural objects. Proper control of environment, minimize decay of objects or stabilize them against further deterioration as far as possible. The custodians of cultural properties should know the properties of the objects, deteriorating factors and symptoms, methods of handling the objects both in display and in storage and safe measures for better maintenance of their collections.

REFERENCES

Agrawal, O.P., Dhawan, Shashi., Garg, K.L., Shaheen, Fauzia., Pathak, Anupama 1988. "Study of biodeterioration of Ajanta Wall Paintings", *Int. Biod.*, pp. 24: 121-129

- Agrawal, a.P. and Dhawan, Shashi., 1989. "Biodeterioration of Cultural Property". Proceedings of the International Conference on Biodeterioration of Cultural Property, NRLC, Lucknow, India, pp. 339-352
- Chakraborty, S., Sen, S.K., Bhattacharya, K 2000. "Indoor and outdoor aeromycological survey in Bardwan, West Bengal, India, *Aerobiologia*, pp.16: 211-219
- Bhattacharyya, R. N, 1986. Experiments with Micro-organisms. Emkay Publication, Delhi, India, pp. 34-50
- Bhowmik, Swama Kamal, 1975. Protection and Conservation of Museum Collection. The Museum and Picture Gallery, Baroda. The Department of Museum, Gujarat, India. pp. 51-65
- Bisht, A.S, 2003. Conservation Science, Agamkala Prakashan, Delhi, India, pp.163-168
- Browne, Michael, 1982. The Museum Interior, Thames and Hudson Ltd, London, pp.120-126
- Garg, K.L et al, 1994. Recent Advances in Biodeterioration and Biodegradation, Vol-I. Naya Prokash, Calcutta, India, pp.121-134, 150-167
- Garg, K.L et al, 1994. Recent Advances in Biodeterioration and Biodegradation, Vol-2. Naya Prokash, Calcutta, India, pp. 55-63, 130-149
- Jeyaraj and Ramesh, 2005. Preventive conservation of Information materials with special reference to manuscripts, The director of museums, Government museum, Chennai, pp. 5-16, 23-45
- Kamalakar, G ; Rao, V. Pandit, 1995. Conservation, Protection and Restoration: Tradition, Trends and Techniques. Birla Archaeological and Cultural Research Institute, Hyderabad, India, pp.34-68
- Kundu, A, "Heritage of Gandhi Smarak Sangrahalaya", Gandhi News, bulletin of Gandhi Museum, January-March, 2012, pp.25-32
- Mitra, Mitra and Chaudhuri, 2002; Studies in Botany. Moulik Library, Calcutta, pp.522- 539
- Nair, S. M, 1982. Biodeterioration of Natural History specimens- Causes and Control. Jour. Ind. Mus.38:27
- Nair, S.M, 2011. Biodeterioration of Museum Materials. Agamkala Prakashan, Delhi, India, pp.2-15, 38-40
- Plenderleith, J.H and Werner, A.E.A, 1971. The Conservation of Antiquities and Works of Art. Oxford University Press, London, pp.125-142
- Shah, Naresh R; Arya, Arun, 2000. Studies on Some Fungal Biodeteriogens. Bharatiya Kala Prakashan, Delhi, India, pp. 28-78, 134-143
- Tilak, S.T; 1984. Biodeterioration of Paintings at Ajanta. Aerobiology Laboratory, Botany Department, Marath Wada University, Aurangabad, pp.307-310
- "Preventive Conservation strategies for organic Objects in Museums, Historic Buildings and Archives". Elin Dahlin, www.chp%3410.l007%2F978-0-387-30525-7_1 (Accessed: 10/05/2012)
- "Biological Deterioration and Damage to Furniture and Wooden Objects" by Smithsonian Museum Conservation Institute, (Accessed: 28/08/2012)
- "Microbial Effect on Organic Objects". International Biodeterioration journal, Vol-28, Issues 1-4, 1991, pp.209-226, ELSEVIER.

Theft: Challenges for Indian Museums

GAURI SHANKAR MAHAPATRA

The increasing number of thefts of works of art and illicit traffic both national and international domain resulting great concern throughout the world. Museums, moreover, are among the most prominent victims of these acts.

The museums of India have rich collections of different kinds ranging from valuable antiquities, priceless miniatures, gold and diamond jewellery, exquisite specimens of rare and superb artistry and tribal arts and crafts.

Most art collectors and antique dealers now take pride in acquiring and collecting Indian art. Art consciousness has also grown amongst the Indians even among villagers who were not aware of the value of their art heritage until few years ago. This consciousness concerns financial as well as artistic value. It has now given rise to the temptation (excitement) of gaining a fortune (wealth) through the sale of these treasures.

Every year theft cases are reported in India. We can site some examples here like:

From Rabindra Bhavana Museum, Shantiniketan on 25 March 2004, Nobel Prize awarded to Poet Rabindranath Tagore, and other sixty items like gold, silver, ivory, bronze artifacts were stolen. Unfortunately, after having no significant clue of the theft, the CBI closed the investigation after a couple of years. May be the theft is due to weak security system – only two national volunteer force personnel are entrusted with the responsibility of guarding the exhibits at the Rabindra Bhavana Museum. According to Prof. Sujit Basu, the former Vice Chancellor of the Viswabharati University, Shantiniketan, a burglary alarm installed many years ago, which does not work, apparently because of lack of maintenance (March 26, 2004, Times of India). The burglars had sneaked into the museum by breaking open the window, railings.

Similarly in the Indian Museum, Kolkata a bust of Buddha of 5th century was stolen in December 2004.

Three valuable silver antiquities were stolen from Religious Gallery, Hazarduari Palace museum in August 2010.

Five gold antiques were stolen from Christian Art Museum, Goa on 25 January 2012.

Valuable objects like pen pistol, silver and gold plated lamp, silver chhatra, silver necklace etc. were stolen from Royal museum of Rewa, Madhya Pradesh on 17th October 2012. The police recovered a major part of the stolen artifacts but the gold and silver pieces have been disfigured and melted.

Study

While hearing a petition moved after the Visva Bharati theft case, Supreme Court also seriously thought about the theft cases and directed the Union Ministry of Culture and the archaeological survey of India (ASI) to file affidavits on what steps they have taken to protect the country's valuable heritage on 28th September 2012. The above cases draw a map of theft in India's museum and arises some questions; who is responsible for theft? What is the reason behind the theft? It may be due to the weak security system or the negligence of museum personnel or the feeble law of India.

During the past few years a new kind of robbery has come into being; thefts and illegal sale and purchase of objects of artistic and historical interest have increased. The situation is alarming and all necessary steps are regined to be taken to present such thefts.

Here some question arises:

- (1) Why the objects are stolen?
- (2) When the objects are stolen?
- (3) From where stolen objects are recovered?
- (4) Who is responsible for the theft?
- (5) Who are the thieves?
- (6) What safety measure taken for it?

- (1) Why the objects are stolen?

In many cases thefts are committed by professionals whose main motive is to earn money. Dealers in art objects pay high and the objects are illicitly exported.

In the majority of cases these thefts are committed from places where there is no technical security system or where the systems are inadequate.

- (2) When the objects are stolen?

The thieves usually work while establishment are closed-at night in small museum. In such a case they enter the premises by the means employed for any type of burglary; forcing a lock or climbing through a window, killing the guard and entered the museum.

In many cases small objects are carefully removed from their stands in daytime.

- (3) From where the stolen objects are recovered?

In many cases the art objects were recovered from antique dealers, dealers, second hand dealers who export those valuable objects in a illegal way. After theft some objects are defacing or taking them to pieces. Jewellery or silver melted down. The stolen goods transfer from one hand to another in a chain like victim-thief, receiver-middlemen (it may be passed on by four or five middlemen), final purchaser. In some cases it is very difficult to be sure its origin and final purchaser.

4) Who is responsible for the theft?

Museums are still protected by the nonprofessionals. Various protection techniques: grids and bars, guards, electronic warning system are being used but, automatic systems still need perfection, improvements still need to be made in the organization of protective devices. The security guard duties might be reviewed. Most of the museums cannot be perfectly protected is due to lack of means and not to lack of knowledge. Lack of legislation is also a main cause.

5) Who are the thieves?

- i) Skill antique thieves, who negotiate a sale in another country and steal well know the value of the art objects in market.
- ii) Thieves who are less well organized and steal jewellery.
- iii) Second hand dealers, who act as receivers

6) What safety measure taken for it?

On security purposes the scope of duty should not be limited as to the type and size of Museum, its ownership by private or governmental bodies or its collection.

It is reasonable for museum managers to foresee "normal" losses typical to museum collections and facilities, including losses due to vandalism, theft.

It is the responsibility of museum operators to take steps to ensure that employees whom they hire do not pose a risk to staff, invitees, museum properties, or the collection.

It is the responsibility of museum operators to report losses truthfully.

The chief security officer should be notified and consulted prior to the object leaving the museum so that adequate security can be provided during transit.

Some suggestive approaches to prevent theft

- ▶ All museums should have intrusion detection and signaling systems. These systems should be monitored 24 hours per day, 7 days per week. There should be an alarm annunciation on the local premises and a back-up annunciation at a commercial central station or the police station.
- ▶ All exterior doors should have magnetic switches to alert the monitoring station.
- ▶ All exterior windows which open should have magnetic switches or other sensing devices that alerts when a window is opened or left open.
- ▶ Selected items on exhibit should be alarmed so that they signal the monitoring station or the local security officer when they are touched or moved.
- ▶ There should be a regular inspection program for all alarm system.
- ▶ Alarm systems should be capable of operating during a power failure for a minimum of 24 hours on batteries.
- ▶ Every museum should have a training program for its security personnel.

- ▶ During requirements of security officer their experience and qualification must be verified.
- ▶ All museums should have a written policy outlining their internal or personnel security programme.
- ▶ All employees, volunteers and hired for work in the museum should be checked.
- ▶ Employees should not be permitted to work or to remain in the museum after hours. This might prevent the alarm system.
- ▶ Photo ID cards should be issued all the staff and it will be checked by a security officer.
- ▶ Biometrics machine should be used for permanent employee for security purposes.
- ▶ All museums containing valuable collections should be staffed by trained security personnel 24 hours per day, seven days per week including holidays.

Bibliography

Jane Legget, (ed.),2011 **"Staff and training in regional museum"**,Paris ,ICOM.

Wise Conrad, (ed.),1974, **"Museum Vol.XXVI,No.1"**,UNESCO.

Deccan Herald,August 20,2012,New Delhi, **"80 percent of antiquity theft cases in India remain unsolved"**.

The Times of India, January 29,2012,Goa, **"Heritage lovers blame weak security for museum theft"**.

The Times of India, October 21, 2012, Indore, **"Police claim headway in Rewa Royal theft"**.

The Times of India, September 29,2012,Kolkata, **"SC moves to protect heritage"**.

শিক্ষাক্ষেত্রে সংগ্রহশালার ভূমিকা

অনির্বান ব্যানার্জী, কারিগরি সহায়ক, গুরুসদয় সংগ্রহশালা

সংগ্রহশালা কিভাবে শিক্ষার বাহন হয়ে উঠতে পারে এ বিষয়ে স্যার আশুতোষ মুখোপাধ্যায়ের বক্তব্য প্রাণিধানযোগ্য "..... the Museum may be regarded, first as an adjunct to the classroom and the lecture room; secondly as a bureau of information and thirdly as an institution for the cultural People. The considerable measure of successful work has been accomplished with these direction, within the limited means at our disposall but these aims are matter of vital importance for the promotion of which further determined efforts must be made" (An inaugural address delivered by Hon'ble justice Sir Asutosh Mookherjee, kt, CSI LLD Indian Museum)

সংগ্রহশালা হল এমন একটি প্রতিষ্ঠান যার সাহায্যে সাধারণের কাছে শিক্ষা পৌঁছে দেওয়া যায়। সংগ্রহশালায় রক্ষিত বস্তুকে কেন্দ্র করে গণজাগরণের পাশাপাশি আমাদের ঐতিহ্যের প্রতি মূল্যবোধ জাগিয়ে তোলা যায়। বর্তমানে সামাজিক অগ্রগতির সাথে সংগ্রহশালার মাধ্যমে শিক্ষা বিস্তারের পরিকল্পনা আদৃত হচ্ছে ভারতবর্ষ সহ পৃথিবীর বিভিন্ন দেশে। পুরাতন বস্তুর সংগ্রহকে রক্ষা করার জন্য, ঐতিহ্যময় শিল্প প্রচেষ্টাকে উৎসাহ দেবার জন্য গ্রামাঞ্চলে বিভিন্ন প্রদর্শনী সংগঠনের জন্য বা লুপ্তপ্রায় লোকশিল্পের পুনরুজ্জীবনের জন্য সংগ্রহশালার একটি অনবদ্য ভূমিকা রয়েছে। লোকশিল্পের উপাদানগুলির মাধ্যমে অন্যতম পটশিল্প, লোকশিক্ষার মাধ্যম হিসাবে আজও সমাদৃত। পশ্চিমবঙ্গের একমাত্র বৃহৎ লোকশিল্পের সংগ্রহশালা : গুরুসদয় সংগ্রহশালা পট সংগ্রহে পশ্চিমবঙ্গ তথা ভারতবর্ষের অন্যতম পথ প্রদর্শক। পটচর্চার ধারাবাহিকতা এই সংগ্রহশালার মাধ্যমে আজও রক্ষিত হচ্ছে। পট ও পটুয়াদের নিয়ে আলোচনা করলে জানা যায় এরা জীবন ও জীবিকার তাগিদে পট নিয়ে গ্রামে গ্রামে ঘুরে বেড়াত। গ্রামের বাড়ি বাড়ি ঘুরে এরা পট দেখাত আর পটের বিষয়বস্তু গান সহযোগে পরিবেশনের সময় মূল্যবোধের শিক্ষা প্রদান করত নিজেদের অজান্তে। পটুয়াদের জড়ানো পটগুলি বিশ্লেষণ করলে দেখা যায় যে শেষের যে দুটি ছবি থাকত তার একটি হল যমালয়ের দৃশ্য আর অপরটি হল জগন্নাথ, বলরাম ও সুভদ্রা, পটের বিষয় যাই হোক না কেন, এরা থাকতেনই। এর মূল কারণ হল তারা বোঝাতেন, যদি তুমি পাপ কর, তোমার যমালয় বা নরকে স্থান হবে, এবং পুণ্য করলে জগন্নাথধামে স্থান পাবে। কি সরল এবং সহজ ভাবে মূল্যবোধের শিক্ষাটি তারা সুপ্রাচীন কাল থেকেই আমাদের মধ্যে চালিত করে এসেছেন।

সংগ্রহশালা হল একটি সামাজিক শিক্ষা প্রতিষ্ঠান যেখানে বিভিন্ন আর্থ-সামাজিক, ভৌগোলিক ও সাংস্কৃতিক পরিমন্ডলের শিল্প সংগৃহীত থাকে-যার ফলে সমাজকে দেখবার, জানবার পাশাপাশি মূল্যবোধের জন্ম হয়; আর এই মূল্যবোধ জাতীয় ঐতিহ্যের প্রতি আমাদের আরও বেশী বিনম্র করে তোলে। আর কোনো যদি জাতীয় ঐতিহ্যের প্রতি শ্রদ্ধাশীল হয়, সেই দেশ, সমাজ উন্নয়নের পথে অগ্রসর হয়। উন্নত, জাতীয় ঐতিহ্যের প্রতি শ্রদ্ধাশীল দেশগুলি পাঠক্রমে সংগ্রহশালাকে অন্তর্ভুক্ত করেছে। বিংশ শতাব্দীর পঞ্চম দশকে Mudaliar Commission এর রিপোর্টে

প্রতি বিদ্যালয়ে একটি করে মিউজিয়াম স্থাপন করার বিষয়ে যথেষ্ট গুরুত্ব আরোপ করা হয়। ভারতবর্ষে বিংশ শতাব্দীর ষাটের দশকে প্রথম বিশ্ববিদ্যালয়ে ‘সংগ্রহশালা বিজ্ঞান’ নিয়ে পড়াশোনা শুরু হয়। এই সময় ভারতবর্ষে দুটি জায়গায় পোস্ট গ্র্যাজুয়েট ডিপ্লোমা কোর্স পড়ানো হত : ১) কলকাতা বিশ্ববিদ্যালয় ও ২) বরোদা বিশ্ববিদ্যালয়। অথচ ঊনবিংশ শতকে ঈশ্বরচন্দ্র বিদ্যাসাগর, রবীন্দ্রনাথ ঠাকুর শিক্ষা ব্যবস্থার সমস্যা, একটি-বিচ্ছিন্নতাবাদী তীব্র সমালোচনার পাশাপাশি পথ নির্দেশ করেছিলেন। তাঁরা দেখিয়েছিলেন শিক্ষা লাভের পাশাপাশি প্রত্যেক বস্তুর সঙ্গে সংস্রবের মাধ্যমে শিক্ষা পদ্ধতির সংস্কার করা যায়। রবীন্দ্রনাথ ঠাকুর ছাত্রদের প্রতি সন্তোষজনক জানিয়েছিলেন সন্ধান ও সংগ্রহ করার জন্য। তাঁর মতে স্বদেশকে ভালোবাসার প্রমাণই হল যারা স্বদেশের সঙ্গে সর্বতোভাবে অন্তর্ভুক্ত রূপে পরিচিত হতে চায়। তিনি বলেছিলেন “দেশের কাব্যে, গানে, ছড়ায়, প্রাচীন মন্দিরের ধ্বংসাবশেষে, কীট দ্রষ্ট পুঁথির জীর্ণ পত্রে, গ্রাম্য পার্বণে, ব্রত কথায়, পল্লীর কৃষি কুটীরে স্বদেশ সন্ধান করিবার জন্য খ্যাতিবিহীন কার্যে স্বদেশ প্রেমকে সার্থক করো।” বিদেশে কিভাবে সংগ্রহশালা শিক্ষামূলক কার্যাবলীর মধ্যে দিয়ে ‘লোকশিক্ষা’ আপামর জনগণের কাছে পৌঁছে দেয়, তা জানা যায় রবীন্দ্রনাথ ঠাকুরের ‘রাশিয়ার চিঠি’ গুলি থেকে। তিনি লিখেছিলেন শিক্ষা ব্যাপারকে এরা নানা প্রণালী দিয়ে সকলের মধ্যে ছড়িয়ে দিচ্ছে, তার মধ্যে একটি হচ্ছে মিউজিয়াম। নানা প্রকার মিউজিয়ামের জালে এরা সমস্ত গ্রাম শহরকে জড়িয়ে ফেলেছে, যে মিউজিয়াম আমাদের শাস্তিনিকেতনের লাইব্রেরীর মতো আকারী (Passive) নয়, সকারী (Active)।

শ্রদ্ধেয় গুরুসদয় দত্ত ও এ বিষয়ে অগ্রণী ভূমিকা পালন করেছিলেন। ভাষাচার্য্য সুনীতিকুমার চট্টোপাধ্যায় লিখেছিলেন “গুরুসদয়ের আবির্ভাব আমাদের জাতীয় জীবনে একটি অভাব পূর্ণ করিয়াছিল, শ্রীযুক্ত অবনীন্দ্রনাথ যেমন আমাদের মধ্যে ভারতীয় চিত্র ও অন্য শিল্পের পুনরুজ্জীবন করিয়া দিয়াছেন, তাহার শিষ্যরূপে শ্রীযুক্ত নন্দলাল যেমন আধুনিক ভারতের শিল্পময় সংস্কৃতির পূর্ণতা দিয়েছেন, তেমনই গুরুসদয় দত্ত মহাশয়ের শুভ সাধনার ফলে বাঙালী তাহার গ্রাম্য জীবনের শিল্পকলাময় অভিব্যক্তির প্রতি, তাহার জীবনে স্বতঃউৎপন্ন নানাবিধ নৃত্যকলা, সঙ্গীত, অলঙ্কার, মন্ডন, চিত্রণ ইত্যাদির প্রতি অনুকম্পা ও আদরের দৃষ্টিতে চাহিতে শিখিয়াছে।” আসলে গুরুসদয় দত্ত উপলব্ধি করেছিলেন বাংলার ঐতিহ্য ও সাংস্কৃতিক মূল্যবোধ যদি প্রসারিত করতে হয়, তাহলে এমন একটা জনশিক্ষা প্রতিষ্ঠানের দরকার যার সাহায্যে জনগণের সার্বিক উন্নতি সাধিত হবে। “সংক্ষেপে এই প্রতিষ্ঠানের উদ্দেশ্য হবে, একদিকে শিক্ষিত সম্প্রদায়, যারা বর্তমানের শিক্ষাব্যবস্থা দ্বারা শিল্প ও কারিগরীর ক্ষেত্রে তাদের জীবন-দায়িনী ভূমিকা, ঐতিহ্যবাহী থেকে বিচ্ছিন্ন অবস্থায় আছে, তার সঙ্গে সংযোগ স্থাপন, অপরদিকে শিল্পী সম্প্রদায়কে তাদের ঐতিহ্যবাহী শিল্প ও কারিগরী বৃত্ত থেকে অযথা বিচ্ছিন্ন না করে তাদের স্ব-ধারাবাহী শিল্প শিক্ষার সঙ্গে বৈজ্ঞানিক পদ্ধতি প্রয়োগে উন্নততর শিক্ষাদান। এই প্রতিষ্ঠান যথাযথ বিকাশ লাভ করলে গ্রামীণ ও জাতীয় পুণঃগঠনের ক্ষেত্রে এক বহু বিস্তৃত রূপ পরিগ্রহ করবে এবং প্রকৃতিগতভাবে এই প্রতিষ্ঠান আগামী দিনে ভারতবর্ষে জনশিক্ষা ও বয়স্ক শিক্ষার এক অনন্য প্রতিষ্ঠান রূপে পরিগণিত হবে এই প্রতিষ্ঠান শারীরিক পুণঃগঠন ও সামাজিক সংহতির এক বিরাট জাতীয় কর্মশালা গঠন করে জনসাধারণকে সমাজসেবা ও গ্রামীণ কর্মচেতনায় উদ্বুদ্ধ করতে উদ্দীপনা যোগাবে। এই প্রতিষ্ঠানের শিক্ষাক্রমে শিক্ষিত সম্প্রদায় ও সাধারণ নিরলস মানুষ যোগদান করতে পারবে এবং তার ফলে বর্তমান ভারতবর্ষে ঐ উভয় সম্প্রদায়ের মধ্যে যে ব্যবধান রয়েছে, তা ক্রমাগত বিলুপ্ত হবে।”

এই জনশিক্ষা প্রতিষ্ঠানের যে ভাগগুলি তিনি করেছিলেন তার মধ্যে অন্যতম ছিল সংগ্রহ বাড়ী (Museum)। তাঁর পরিকল্পনা প্রসূত সংগ্রহ বাড়ী বর্তমানের গুরুসদয় সংগ্রহশালা; যা আজ জনশিক্ষা, জন সংযোগ মহীরাহে

পরিণত হয়েছে। সংগ্রহশালা কিভাবে মূল্যবোধের শিক্ষা পরবর্তী প্রজন্মের মধ্যে জাগিয়ে তুলতে পারে, তার আদর্শ উদাররণ এই সংগ্রহশালাটি, নানান কর্মসূচী অঙ্গন শিক্ষা থেকে শুরু করে, জাতীয় ঐতিহ্য নিয়ে আলোচনা, কর্মশালা সংগঠনের পাশাপাশি স্কুলগুলিতে বাংলার লোক ঐতিহ্য, শিল্প নিয়ে প্রদর্শনী, পাওয়ার পয়েন্টে উপস্থাপনার মধ্যে দিয়ে অতীতে পৌঁছে যাওয়ার প্রচেষ্টা প্রশংসনীয়। আর যদি অন্যান্য সংগ্রহশালাগুলি এইভাবে এগিয়ে আসে, ভবিষ্যৎ প্রজন্মও প্রত্যক্ষ বস্তুর সংস্পর্শে শিক্ষার আলোকে উদ্দীপিত হবে।

Museums

Future Present: A study tour to the museums in U.K.

23 January – 1 February 2011

PIYASI BHARASA

As we revisit the memory of our trip to the museums, we all agree that we learn a new thing on every single visit. Experiences, such as visiting a museum, may contribute to successful social relationships in a manner that material items cannot. Visiting a museum makes a person enriched in the long run.

We know that the primary role of museums is to engage and educate the community informally. Museum exhibits, inspires, interests in an area of study, a particular time period, or an idea— but there is much more going on in museums in regard to education than one might think. Galleries are becoming classrooms, and not just for children, but for all the visitors. It becomes nearly impossible to exit a museum without having gained any information or insight during any visit. Even a single visit to a museum can expose visitors to in-depth information on a subject, and the nature of the museum environment is one in which visitors can spend as much or as little time as they like to explore exhibits.

Having aimed and inspired with these objectives a study tour to museums in U.K. was conducted by the Ministry of Culture, Government of India in association with British Council, Kolkata as a part of its '14 issues museum reforms programmes. It is true that such exposure was much needed for the museum professionals in India. The Ministry conducted the study tour for us to visit the leading museums in U.K. during 23 January to 1 February, 2011. We, the museum professionals from the National Museum, New Delhi, National Museum Institute, New Delhi, Allahabad Museum, Allahabad, National Council of Science Museums, New Delhi, National Gallery of Modern Art, New Delhi, Salar Jung Museum, Hyderabad, Indian Museum, Kolkata and Victoria Memorial Hall, Kolkata were selected by the Ministry to participate in the study tour. The focus of this article is therefore, sharing my little knowledge and experience I gained during the study tour.

The study tour started with an opening session at the British Council, London in the winter morning of 24 January, 2011.

Opening Session at the British Council, London

In the opening session, a panel discussion on the mission and practices of the U.K.

museums with presentations by the Directors and Heads of learning and Interpretations from the museums and cultural institutions across U.K was organized. It was an orientation session for us where we got to know about the U.K. museums-how methodically and professionally the museums were run with clear vision and missions, in U.K.

Victoria & Albert Museum (V&A, London)

After the session, we reached V&A, London, one of the leading museums on art and design. V&A in South Kensington is the world's greatest museum of art and design, with collections¹ unrivalled in their scope and diversity. It houses artifacts from many of the world's richest cultures including ceramics, furniture, fashion, glass, jewellery, metalworks, photographs, sculpture, textiles and paintings.

At V&A, we had discussions and presentations on dynamic programmes and resources, V&A offered to school students, teachers and other visitors. We visited the new Sackler Centre, which is V&A's centre for public learning through creative design and the arts, based on its collections. We got the opportunity to see the digital and art studios for workshops, courses and drop-in programmes, as well as seminar rooms for courses, study days and seminars. In addition, we learnt about the residency studios for creative professionals, and the opportunity to learn new skills, both digital and traditional.

Kate Bellamy, Head of International Strategy and Elizabeth Hamilton, the Guide at V&A conducted an educational tour of the V&A, but that was not the last thing for us. We met the well known curators and had several presentations on Exhibitions, Learning and Interpretation, Audience Development, Engagement of Schools, Families, Young People etc.

We returned back hotel with full of surprise and thoughts as to how, the Indian Museums were working in comparison to the developments done by the U.K. museums. The next morning, 25 January, 2011, we visited Horniman Museum and were spell bound with its interactive display.

The Horniman Museum, London

The Horniman² Museum in South London, had an internationally important collection of ethnographic and natural history material from all over the world. It also had a fantastic collection and display of musical instruments, where we found the school children were enjoying and interacting with the learning and interpretation professionals.

¹ V&A houses a permanent collection of over 4.5 millions objects

² Named after Frederick John Horniman, who first opened his house and extraordinary collection of objects to visitors.



Children, enjoying and learning through the display at Horniman Museum, London

In addition to interactive displays, the Horniman runs an innovative school programmes, offering object handling sessions and Museums and Gardens activities and tours. It was noticed that the museum had strong links with its local community, which represents many diverse cultures. In addition, it manages a series of research projects, including a long term research programme in India to collection recordings of traditional music.

The tour ended with the presentations by the professionals of the museum on its activities. Our next destination was the Museum of London, the London's city museum.

The Museum of London

The Museum of London is the world's largest urban history museum, having over 1 million objects which tell the story of London from prehistory to the present day.



Family object hunt at Museum of London

The Museum's learning team interacted with us on the wide variety of activities for schools and teachers, and adult learners. The Clore Learning Centre, the Museum of London's new learning space, opened the previous year, offers inspiring learning programmes with an e-learning studio. We learnt that the schools could experience a wide range of sessions such as object handlings, storytelling, using digital cameras and camcorders, Play Station Portables, iPods and mobile phones. The Centre includes a 230 seat theatre with a stage large enough for class performances.

On our arrival, Sandra Hedblad, Programme Manager - Family Learning gave an overview of the work of the Learning Department followed by an introduction to the Programmes run by the museum which helped us to understand some innovative educational activities of the museum.

On the next morning (Wednesday 26 January), we boarded the Train to my childhood dream destination, Oxford and thereafter walked to the Ashmolean Museum.

The Ashmolean Museum, Oxford

Founded in 1683, the Ashmolean is the Britain's first public museum and home to the University of Oxford's world-class collections of art and archaeology. The Ashmolean is a University Museum and a Department of the Oxford University. The Museum has very close links with the faculties, and the colleges, and museum staff undertake a great deal of University teaching and research. The Museum's Collections are also an important teaching and research resource for scholars and students from other institutions both in U.K. and abroad.



Display at Ashmolean Museum, Oxford

At the museum, we met Helen Ward, Deputy Head of Education with her welcoming smile. We got opportunity to interacting with Jo Rice, Head of Education who explained us the role of the Education Team in the re-development of the new galleries. Helen with lot of care and concern gave us a short tour of the new Ashmolean Museum, shown us improvements being made to the West meets East Gallery. After the interaction, we got about one hour for self guided exploration of the Museum which I personally thoroughly enjoyed and tried to grasp as much as I could.

Oxford University Museum of Natural History and Pitt Rivers Museum

In the afternoon, Andrew McLellan, Head of Education was waiting for us at the Porters desk of Oxford University Museum of Natural History. Andrew explained us the vision and mission statements of the Museum and gave a guided tour and shown us the labs for conservation and research area. Julia Nicholson, Head of Collections then talked to our group in the Collections office. Julia shared her experiences in the field works she had done in Gujarat and also explained how she was engaging with Indian communities in the U.K. based on those experiences. This visit was completely amazing and was very useful for us.

Our next stop was the Pitt Rivers museum where we met Mike O'Hanlon, the Museum's Director and Clare Harris, curator of the Asian collections. Clare was an Oxford University academic who had done research on Tibet and done a lot of works in Darjeeling, Himachal Pradesh and Ladakh. In Pitt Rivers, we participated in a 'Treasure Hunt' which was both enjoying and educative.

On Thursday, 27 January, 2011 we finally reached the much awaited destination, The British Museum, London.

The British Museum, London

The British Museum is one of the greatest museums of the world and its unique collection of seven million objects represents the history of human cultures. It is also the world's first public museum.

Siobhan O'Leary, World Collections Programme coordinator received us at the main entrance of the museum. The British Museum's Education team offered us with a range of presentations on activities, workshops and courses for schools and teachers, families and adult learners to inspire learning, debate and curiosity about the cultures of the world. In addition, we visited the new Samsung Digital Discovery Centre, which offered free activities for families and schools using the latest Samsung digital equipment.

The Director, Neil McGregor, Joanna Mackle, Xerxes Mazda and other colleagues conducted a special session for us on the mission, vision, activities and future plans of the British Museum. The Director stressed on engaging audiences and world communities with museums. The session was quite educative since

most of us came across some new ideas on people's engagement with the museums. The tour ended hurriedly and our next destination was the Natural History Museum.

The Natural History Museum, London

The vision of the Natural History Museum was to advance our knowledge of the natural world, inspiring better care of our planet. We saw that the Museum maintained and developed their collections³, and used them to promote the discovery, understanding, responsible use and enjoyment of the audiences. Honor Gay, Head of Learning gave an insightful talk on the various innovative educational services of the Museum which was very useful for us.

In the afternoon, we took a flight and arrived in the evening at Belfast International Airport, Ireland where Collette Norwood, British Council Arts Manager received and took us to our hotel accommodation.

On Friday, 28 January, 2011 morning, we visited Ulster Folk and Transport Museum in Belfast. Belfast is the capital and largest city of Northern Ireland. Most of Belfast is in County Antrim, but part of East and South Belfast are in County Down. It is on the flood plain of the River Lagan. Belfast played a key role in the Industrial Revolution, establishing its place as a global industrial centre until the later half of the 20th century. We saw that all the national museums in Belfast portrayed this history beautifully through various displays.

Ulster Folk & Transport Museum, Belfast, Ireland

The Ulster Folk and Transport Museum (UFTM) were situated in Cultra, Northern Ireland, in the city of Belfast. The Ulster Folk and Transport Museum provided a particularly interesting link with the peasant origins of Northern Ireland and includes an open-air folk museum. It comprised two separate museums, the Folk Museum and the Transport Museum. The Folk Museum endeavoured to illustrate the way of life and traditions of the people in Northern Ireland, past and present, while the Transport Museum explored and exhibited methods of transport by land, sea and air, past and present.

The museum ranked among Ireland's foremost visitor attractions and is a former Irish Museum of the Year. It was one of three national museums of Northern Ireland.

³ The collection of Natural History Museum at the beginning belonged to Sir Hans Slone, an 18th century collector.



Display at Ulster Folk Museum, Belfast, Ireland

At the museum we met Paddy Gilmore, Director of Learning & Partnerships & Dr Jim McGreevy, Director of Collections and Interpretation who explained collections and education programmes of both the museums. We visited the Folk Museum which housed a variety of old buildings and dwellings which have been collected from various parts of Ireland and rebuilt in the grounds of the museum. The 170 acres of the museum premises were devoted to illustrating the rural way of life in the early 20th century, and visitors could stroll through a recreation of the period's countryside complete with farms, cottages, crops, livestock, and visit a typical Ulster town of the time called "Ballycultra", featuring shops, churches.

The Transport Museum housed an extensive transport collection, and endeavoured to tell the story of transport in Ireland, from its early history to the modern era. It was the largest railway collection in Ireland. Attractions in the grounds themselves included a model railway operated by the Model Engineers Society of Northern Ireland.

We found that the museum mounted a permanent *Titanic* exhibition, documenting the construction, voyage, and eventual sinking of the ill-fated vessel. The ship had long been associated with Northern Ireland, as it was constructed in the Harland and Wolff shipyards, just a few miles from the museum. The newly refurbished *Titanic* exhibition, tying in with the Folk museum's 'Titanic Trail' was entitled 'Titanica'. The museum's tour guides gave us a tour of both the museums in 2 groups.

Ulster Museum, Belfast, Ireland

In the afternoon, we visited the Ulster Museum. The Ulster Museum, located in the Botanic Gardens in Belfast, had 8,000 square metres of public display space, featuring material from the collections of fine art and applied art, archaeology, ethnography, treasures from the Spanish Armada, local history, numismatics,

industrial archaeology, botany, zoology and geology. It is the largest museum in Northern Ireland, and one of the museums of National Museums of Northern Ireland.

It was very surprising to know that the Museum was completely closed for nearly three years (2006 to October 2009) while it was under large scale renovation. It was re-opened to the public on 22 October 2009, on its 80th anniversary. The museum team showed us presentations on Educational Activities, Special Programmes & Collections, and History to present day working of the Museum. That was end of the museum tour to Ireland. The next morning of Saturday, 29 January, 2011 we took flight from Belfast to Glasgow. On Sunday, 30 January, we visited The National Museum of Scotland in Edinburgh and met Henrietta Lidchi, Keeper, Department of World Cultures.

National Museum of Scotland

We were informed that it was a vibrant museum for the 21st century, opening up public spaces, providing new facilities and displaying natural world, world cultures, art and design and science and technology collections in innovative new ways.

Henrietta was the Keeper of the Department of World Cultures at National Museums of Scotland, responsible for its staff, projects and collections. Her research interests/expertise was North American collections, particularly American Southwest; Native American jewellery from the Southwest, visual anthropology, museology and cultural policy. She interacted with us on various issues on policy decisions, managing collections and exhibitions.

On Monday, 31 January, 2011 the last day of our study tour, we visited Kelvingrove Art Gallery and Museum, Glasgow.

Kelvin Grove Art Gallery and Museum and Glasgow Museums Resource Centre

The Kelvingrove Art Gallery and Museum was a museum and art gallery in Glasgow, Scotland. The building housed one of Europe's great civic art collections. Since its refurbishment (2003-2006), the museum had been the most popular free-to-enter visitor attraction in Scotland, and the most visited museum in the United Kingdom outside London.

It had one of the finest collections of arms and armour in the world and a vast natural history collection. The art collection of the museum included many outstanding European artworks, including works by the Old Masters, French Impressionists, Dutch Renaissance, Scottish Colourists and exponents of the Glasgow School. It offered a range of educational programmes for all level of visitors.



Display and lighting at Kelvin Grove
Art Gallery and Museum, Glasgow, Scotland

During the visit we also got opportunity to visit the Glasgow Museums Resource Centre. The Glasgow Museums Resource Centre was the centralised collections storage and preparation facility for all of Glasgow Museums, ranging from the Kelvingrove to the People's Palace to the Gallery of Modern Art. Martin Bellañy, Research Manager, very kindly gave a brief introduction to the Glasgow Museums and take participants on a tour to the resource centre, giving a taste of the vast collections and methods for categorising, storing, and researching them. After a brief break, Martin offered us a presentation on object-based research, using artefacts from the Glasgow collections as case studies.

Conclusion

That was end of the study tour to the museums in U.K. We the museum professionals of India were extremely benefited with the study tour. Our minds were full with all the new insights and thoughts from the visits to the museums in U.K. This tour provided us much needed information on the latest trend of display, design, conservation and community engagements and other educational activities. Many of us, later, experimented with these ideas in the perspective of museums in India and were successful. We strongly felt that these kinds' of activities are required for all museums in India.

The study also revealed that creating community involvement was more about location than the activity at hand, and this kind of location-based learning triggered for change and development within the community. As museums were functioning more and more like community centers in providing access to current research and new ideas, they became hot-spots for civic engagement. It was very good to see in the museums in U.K. that the school teachers were, on spot, demonstrating some of the exhibits to the students in the galleries. As a result, the school children were seen to be engrossed with the display and were learning very happily at the

museums. The effort to promote education and conservation that were taking place in museums across U.K. was an eye opener for us.

The study tour provided us a great exposure to spend time with the specialists and museum professionals of various museums in London, Ireland and Scotland. Many professional connections were made with museums during the visit. We thoroughly enjoyed the tour too, since there was concerted effort by the museum professionals in the every museum we visited. The tour provided a shared learning experience and motivation for us.

Acknowledgements

Ministry of Culture, Govt. of India, New Delhi

Victoria Memorial Hall, Kolkata

British Council, Kolkata and London

Indian Air Force Museum: Special Reference to Eastern Command Museum, Shillong

DHRITI RAY

Introduction

Indian Air Force was officially established on 8th October, 1932 during the period of Second World War. The Air Force has commendable history of its active participation in Burma War (1942), during Independence and partition of India, China War (1962), War in Sub continent (1965), War of 1971 for the freedom of Bangladesh and many more till the last Kargil War (1999) against Pakistan. Beside the war situation Indian Air Force has also taken part in the great expeditions like sending Indian Astronaut, Captain Rakesh Sharma to the Moon in 1984, series of expeditions to the Everest and other Himalayan peaks etc. In case of any emergency situations, rescue operations etc. within the nation or across the world, Indian Air Force always take a lead. For the knowledge and education about the history, activities and achievement of Indian Air Force as well as for the display of Air force memorabilia, the Government of India accorded sanction on 6th June 1955 to set up first Air force Museum in New Delhi.

The Western Command of the Indian Air Force has set up the first Air Force Museum in Palam near New Delhi on 8th April 1967. The museum exhibits the vintage aircrafts of national importance, vehicles, Radar Equipment etc. outside the museum. Within the building the museum exhibits war memorabilia, documents, historic photographs, uniforms, weapons, anti Aircraft guns, etc. of the Indian Air Force since its inception in 1932. This IAF Museum offers an insight not only into the history of the Indian Air Force but a complete picture of Military aviation in India. Starting from the initial days when Indian aviators flew for the Royal Flying Corps during the First World War, right up to the days of the Kargil Operations. The visitor is regaled with pictures, mementoes, souvenirs, models, and the actual aircraft themselves in the Palam Museum.

After three decades the second Air Force Museum was set up by the Eastern Air Command of the Indian Air Force in Shillong, Meghalaya on 15th April, 2004. The museum is named as the Eastern Command Museum and Archive. The museum provides information on the history of the Indian Air Force. The Main attraction of this museum is its important collection of aircrafts, documents and memorabilia associated with the War of 1971 for the freedom of Bangladesh. The

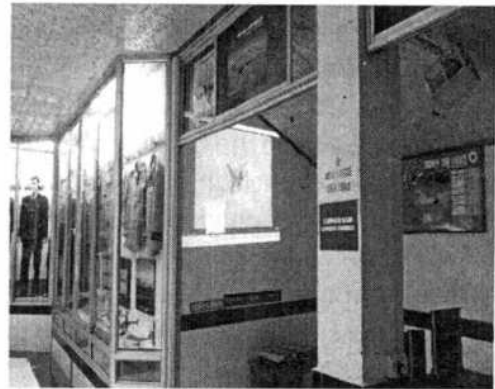
museum is situated within the Headquarter of the Eastern Command of the Indian Air Force. It is on the tourist route of Shillong on the way to Cherrapunjee, at a distance of 8 km from the city and a large number of national and international tourists as well as school students from entire North East India regularly visit this unique museum. Though the visit to this museum is entirely free but Photo Identity Card is essential to enter into this museum. The museum is open in all days but half a day on Sundays.

Museum Exhibits

Exhibits are displayed in both inside and outside the museum. The museum has major three sections viz. Air Force small exhibits, Culture Section and Aerospace Complex for the display of vintage Aircrafts, carriers etc.

A. Air Force small exhibits

Within the museum building there are number of small galleries to exhibit the history and motto of Indian Air Force; display of the photographs of all Air Chief Marshals; Uniforms; an Ejection Seat of the fighter aircraft with a mannequin showing the mechanism of ejection of bombs during wars; photographs of different bombs and fuses; replica of muzzle loading shot gun of 16th century AD; head rocket Aircraft etc. There is a Victory Room showing the 1971 operational facts culled out from open sources, which are displayed through map, photographs and documents. Memorabilia in photographs of 1971 war is also displayed in this section.



B. Cultural Complex

The Museum has unique collection of the ethnic culture of Eight North Eastern States viz. Assam, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura and Sikkim. Using beautiful mannequin the folk culture and tradition of the North Eastern India are displayed in this section. Being different to the main theme of this museum, this cultural section entertains tourists coming from different parts

of the country as well as from abroad. The section has a unique collection of a python skin and a deer skin collected by an Air Force Team. It was the Python who had engulfed the deer. The entire incident was photographed and displayed in this museum. After eating the deer, the Python was killed by the Air Force Team and dead deer was recovered from the Python's stomach.



C. Aerospace

In a considerable open air area of the Eastern Command Headquarter an aerospace is created to exhibit the vintage aircrafts, carriers and vehicles used during the War of 1971. Among them the fighter plane Caribou which was used in the Indo-Pak War of 1971 is most important. Among others few important aircrafts are, a De Havilland Caribou, PZL Iskara TS-11, a Hawker Hunter, a model of the Phantom-50 AWACS etc. The Caribou craft was used to bring Muzibar Rahaman from Bangladesh to India. Visitors can see and touch all the original aircrafts in this aerospace and can take photographs with each.



Archival Objects

All the archival objects like documents, route map, photographs etc. are displayed along with the other objects. There is no separate gallery for this. Majority of these archival objects are copy and laminated for display. People can read the documents.

Museum Souvenir Shop:

The souvenir shop is for those who are willing to take a part of history with them to home. In this souvenir shop visitors can purchase T-Shirts, Key Chains, Postal Covers, Bottle Openers and even Chinaware. Hologram of Indian Air Force with special event is imprinted in the entire souvenir item.

Service Provided

As the museum is housed within the Head Quarter of the Eastern Command of Air Force, it provides the basic knowledge about the activities of Indian Air Force to all who comes here to select Air Force as career and also to the trainees. Within the museum there is a Career Corner where interested candidates can view films on various activities, mode of operation during the Wars, mode of aircraft operation, ejection system in fighter aircrafts etc.

Visitor has the opportunity to take photograph inside the museum as well as in the aerospace with the vintage aircraft. There is no guide available in the museum, but all the exhibits are labeled descriptively in English, which are adequately informative to all visitors who can read English. No leaflet or brochures are yet prepared by the museum.

As the archival objects are not original there is no conservation unit or service available in this museum. A large number of objects are displayed together in this museum. Apart from the labeled information, a trained Air Force Official as guide is urgently required so that all civilians can understand the objects and its function interestingly.

Public Relations by the Museum

The museum is included in the tourist route of Shillong and information about the museum is disseminated through signboards given in the strategic locations on the Highway approaching to Shillong and Way to the Museum. Within the Eastern Command Complex the direction for approaching the museum is given to help tourists. At the entry gate the Air Force Officials details every visitor about the dos and don'ts inside and outside the museum as the area is high security zone. The Museum Curator is also ready to help all visitors. Museum at present do not have any publication for visitors.

Birmingham Museum and Art Gallery – its history and collections

SUHASHINI SINHA

Introduction

Birmingham Museum and Art Gallery, situated in the city centre of Birmingham, United Kingdom, is the largest of eight museums and heritage sites managed by the Birmingham Museums Trust, the UK's largest independent museums trust. As well as Birmingham Museum and Art Gallery, the other sites include: Aston Hall - a Jacobean mansion; Blakesley Hall – a Tudor period timber framed house; Sarehole Mill – a working watermill; Soho House – a Georgian period town house; The Museum of the Jewellery Quarter – originally the headquarters of Smith & Pepper jewellery manufacturers; Weoley Castle – the 700 years old ruins of a medieval manor house; and the Museum Collections Centre – a purpose built storage centre for Birmingham Museums Trust stored collections.

This paper will concentrate on the history and collections of the Birmingham Museum and Art Gallery (BMAG). Opened in 1885, the museum was the vision of some of Birmingham's most notable 19th century industrialists and wealthy citizens. The museum currently displays art, applied art, social history, archaeology and ethnography collections

The foundations of the museum

The history of the Birmingham Museum and Art Gallery has its origin during the Industrial Revolution of the late 18th and early 19th century, during which British goods began to be mass produced for use throughout the empire.

Like most of Britain's major cities Birmingham underwent rapid industrialisation and urban growth, transforming it from a market town into a hive of economic activity. Birmingham's economy was based on numerous small workshops, which produced a huge variety of commodities for both expensive and cheaper tastes¹. It was recognised that good design was essential to Birmingham's manufacturing industry and that Birmingham's craftspeople needed access to industrial art from which they could draw inspiration. Following the success of the Great Exhibition of 1851 at Crystal Palace London, the idea arose for an Industrial Museum and Art Gallery in the centre of Birmingham, to serve as a model of industrial design excellence.

By the 1870s prominent industrialists were leading the campaign for a purpose built museum and art gallery in Birmingham. In 1871, Thomas Clarkson Osler of the Birmingham glass making firm F. & C. Osler put up £3000 to found a Public Picture Gallery Fund to acquire works for an art gallery, starting the gradual replacement of private with public funding for acquisitions². Joseph Chamberlain, Mayor of Birmingham and a key figure in the city's history, was one of the fund's trustees. Chamberlain added to Osler's donation in 1875, presenting the Corporation with £1000 "to be expended ...in the purchase of objects of Industrial Art"³. In 1881 Richard Tangye, of the 'Tangye Brothers' engineering firm, gave a total of £11,000 to the Corporation. The Tangye Brothers also donated their exceptional collection of early Wedgwood in 1883.

The new Birmingham Museum and Art Gallery opened on the 28th November 1885 at the heart of a new cultural centre in the city. It was through the generosity of Birmingham manufacturers that the museum was finally realised, as reflected in the foundation stone in the museum's entrance hall that reads '*By the Gains of Industry we promote Art*'.

The museum's first curator, known as the 'Keeper of the Art Gallery', was Mr Whitworth Wallis who established BMAG as the leading provincial museum of the time. Following the museum's opening, certain individuals emerged as important contributors to the building of BMAG's collections. From 1885 John Feeney, founder of the Birmingham Daily Mail, donated art objects from all over the world, primarily South Asian and East Asian metalwork. His nephew Sir Charles Hyde presented his collection of Japanese *tsuba* (sword furniture) in 1930. Arthur Wilkins, a Birmingham born collector of ethnographic objects, donated his entire collection of 1300 items to BMAG, also in 1930.

Applied and Decorative art

BMAG's internationally significant collection of decorative and applied arts contain world ceramics, jewellery, Birmingham manufactured silverwork, metalwork and glass including stained glass and woodwork. The collection is displayed in the Industrial Gallery, which opened in 1885.

Among the most celebrated items in this collection are those created by Matthew Boulton, considered the father of Birmingham's silversmith trade. Boulton inherited his father's 'toy' business and in 1761 began building a new factory to the north of Birmingham at Soho, where he developed the business into a major industrial complex. As well as producing 'toys' – small goods such as buttons, buckles and hooks - which were the staple of Birmingham industry, he helped to establish the

²Davies 1985, p.17

³Davies 1985, p. 18

Boulton & Watt steam engine and invented the first steam driven mint⁴. In 1773, to allow hallmarking of silver in Birmingham, Boulton founded the Birmingham Assay Office which is now the largest assay office in the world⁵.

Prior to 1773, Boulton had concentrated on working with materials in metals other than silver, such as Sheffield plate or *ormolu* (finely ground high carat gold applied to bronze items). BMAG's collection contains Boulton's ormolu mounted items such as the two ewers.

Asian art: The Sultanganj Buddha

The Sultanganj Buddha is a highly significant work in BMAG's Asian art collection⁶. The figure stands 2.23 metres high and is one of the largest known complete Indian metal sculptures. The Buddha had stood on a stone base at the centre of a *vihara*, (a Buddhist monastery courtyard), but had been tipped into a hole by the monks when the monastery came under threat, where it lay undiscovered for 500 years. The sculpture dates from the 6th or 7th century and is typical of the Gupta sculptural style.

The Buddha was discovered in 1862 by E.B Harris, an engineer on the East Indian railways who was excavating for a railway at Sultanganj, Bihar. Coming across a copper foot buried ten feet under the surface; he dug further and discovered the large Buddha figure. Birmingham based railway fitting manufacturer and former mayor, Samuel Thornton, paid £200 to ship the Buddha to Birmingham where in 1864 he donated it to the museum.

The Sultanganj Buddha now sits in BMAG's Buddha gallery, which opened in 1998. This gallery also displays Buddhist, Jain and Hindu sculptures from BMAG's own Asian art collection, as well as loan objects from the British Museum and the V&A. The Buddha gallery is of particular interest to Birmingham's sizeable South Asian community, with The Sultanganj Buddha being the focus of the annual Buddha day celebrations, during which offerings are left at the feet of the figure.

The Pre-Raphaelite collection

BMAG holds a Pre-Raphaelite collection of world importance. The collection began around 1885 with local industrial and political patrons promoting the acquisition of a near contemporary Pre-Raphaelite collection, acquiring paintings for the museum that have since become world famous. The collection includes around 2000 fine and decorative art works including oil paintings, tapestries, drawings and sketchbooks, making it a central resource for the study of the founders of the Pre-Raphaelite brotherhood⁷.

⁴Ellis, 1999, p.128

⁵<http://www.theassayoffice.co.uk>

⁶Ellis, 1999, p.72

⁷www.preraphaelites.org.uk

Ford Maddox Brown's 'The Last of England' is one of the best known paintings in BMAG's Pre-Raphaelite collection. It was painted when Brown described himself as "intensely miserable, very hard up and a little mad"⁸ and when his thoughts turned often to immigration. The painting shows a couple turning their backs on their homeland to leave for foreign shores. The contrast between the poise of the couple and the chaotic behaviour of the rest of the passengers behind them is beautifully realised, and the circular frame draws the eye into the picture. The couple was modelled by Brown himself and his wife, Emma, who cradles their baby son, while their daughter Cathy can be seen in the background of the picture, holding an apple. The painting was purchased for the museum in 1891.

Social History - The Birmingham History Galleries

Over the past ten years BMAG has recognised the need to tell the people of Birmingham more about their local history. As a response to this demand, the Birmingham history galleries opened in 2012, in collaboration with the city archives and University of Birmingham. Entitled '*Birmingham: its people, its history*', the galleries describe how Birmingham became the city it is today while exploring the lives and histories of Birmingham's inhabitants in detail, including the opportunity for visitors to contribute their own Birmingham stories. The galleries offer a unique opportunity to display little seen objects from BMAG's social history collections, including medieval metalwork, 18th century decorative arts, Victorian costume and objects from the two World Wars⁹.

Treasure at BMAG - The Staffordshire Hoard

In recent years, BMAG has been home to The Staffordshire Hoard, the largest collection of Anglo-Saxon gold and silver metalwork ever found. The hoard was discovered by Terry Herbert, while he was metal detecting in a field near the village of Hammerwich, Staffordshire on 5 July 2009. Due to the importance of the find, English Heritage and Staffordshire County Council funded an archaeological excavation to uncover the entire hoard.

The hoard comprises more than 3,500 artefacts and fragments, made of gold, silver and copper alloy. The items are remarkable for being almost exclusively warlike in character, featuring pommel caps (the tip of the sword hilt that anchors the hilt to the sword blade) and hilt plates. Part of a helmet was also found, along with at least two Christian crosses, although no sword or dagger blades were found.

⁸Ellis, 1999, p.164

⁹BMAG Collecting Policy 2009-2013.

Many of the items feature decoration in garnet, with elaborate designs often depicting animals or geometric patterns in filigree metalwork. The artefacts date to the 7th or 8th centuries AD¹⁰.

The Staffordshire Hoard was declared to be Treasure, under the 1996 Treasure Act, at a coroner's inquest in September 2009. The Treasure Valuation Committee valued the hoard at around £3 million pounds. Following this, the hoard was saved for the nation in March 2010. Thanks to the generous support of the public, trusts and foundations and the National Heritage Memorial Fund (the Government's fund of last resort for heritage items at risk) the hoard was secured for BMAG and the Stoke Museum through Birmingham and Stoke-On-Trent City Councils¹¹. BMAG now has a gallery devoted to displaying some of the key finds from the Staffordshire Hoard.

Conclusion

21st century Birmingham is a multicultural and growing city. At the most recent UK census in 2011, it was found that over one million people now live in the city. Around 42% of Birmingham residents are from an ethnic group other than White British, and 22% were born outside the UK¹². A key priority of BMAG is to develop collections which reflect the cultural identities, histories and concerns of the diverse society in which it operates.

The collecting strategy objectives for 2013 include: acquiring material to reflect the cultures of the city, strengthening existing collections of material representing Muslim cultures and increasing the representation of women artists¹³. BMAG recently acquired a contemporary work by female Pakistani sculptor Halima Cassel. Born in Pakistan, brought up in Manchester and now living in Blackburn, Cassel's varied, multi-cultural background is seen in her work¹⁴. The piece that BMAG acquired is entitled 'Caliope' and was purchased at 'COLLECT' the International Art Fair for Contemporary Objects. The museum was one of nine UK museums whose curators successfully pitched to a panel of judges, to win a share of £75,000 provided by the Art Fund Collect scheme, in order to purchase an outstanding piece of contemporary art.

The BMAG collections form a powerful expression of the interests of the people of Birmingham since the 1860s, and play an essential role in defining the city's identity, as well as enhancing its international cultural profile. BMAG's current

¹⁰<http://www.staffordshirehoard.org.uk>

¹¹<http://www.bmag.org.uk>

¹²<http://www.birmingham.gov.uk>

¹³BMAG Collecting Policy 2009-2013

¹⁴<http://www.halimacassel.com>

mission statement bears reflection of this wider view, replacing the 1885 manifesto 'By the gains of industry we promote art' with 'World Class museums at the cultural heart of Birmingham'. From its beginnings as an Industrial art museum in Victorian Birmingham, BMAG has now become a place of knowledge and inspiration for the people of Birmingham and the wider world.

Acknowledgements

The author would like to thank all the staff at BMAG for being so helpful with their time, support and knowledge during the research for this paper. In particular thanks must go to Adam Jaffer, Rebecca Bridgman, Zelina Garland, David Symonds and Dominiki Papadimitriou.

Bibliography

Birmingham Museums and Art Gallery. *Collecting policy 2009 – 2013*. Birmingham City Council. 2009

Population and Census [online]; available www.birmingham.gov.uk/cs/ [accessed 18 July 2013]

Staffordshire Hoard [online]; available <http://www.bmag.org.uk/collections/staffordshire-hoard> [accessed July 2013]

Davies, S. *By the Gains of Industry. Birmingham Museums and Art gallery 1885-1985*. Birmingham Museums and Art Gallery. 1985

Ellis, M. *World Art from Birmingham Museums and Art Gallery*. Birmingham Museums and Art Gallery. 1999.

Hallma Cassel, the artist, [online]; available www.halimacassel.com/the-artist/ [accessed July 2013]

The Pre-Raphaelite Collection, [online]; available <http://www.preraphaelites.org.uk/the-collection/about-the-collection/> [accessed July 2013]

Staffordshire Hoard, The Find [online]; available www.staffordshirehoard.org.uk/about/ [accessed 18 July 2013]

The Birmingham Assay Office homepage [online] available <http://www.theassayoffice.co.uk> [accessed July 2013]

Additional references

Bruton, O., Yardley, R., Roberts, H., Kolkisko, T., *BMAG History Project 2012*. Unpublished, 2012.

Birmingham Museum and Art Gallery History Project. [online]; available <http://bmagblog.wordpress.com> [accessed July 2013]

The genesis of Rabindra-Bhavana as a Museum: Rathindranath Tagore's legacy

SASWATI PAL CHOUDHURI

Rabindra Bhavana has a huge collection of materials concerning or related with the Acharya – Pratisthata Rabindranath Tagore. This makes Rabindra Bhavana a prime center of culture and art. These huge collections of Rabindra-Bhavana are well preserved and it regularly organise seminars, conferences, exhibitions, workshops. Rabindra Bhavana has ten different sections namely- Museum, Archives, Audio-visual, Preservation section, Garden, Lipika archives, Santiniketan Griha Museum, Research Project, Library. All these things have made Rabindra Bhavana a museum of international standard. But to look back the history of Rabindra Bhavana's and the evolution of museum, we have to go back a few decades in history.

Rabindranath Tagore breathes his last on august 1941, leaving behind not just his huge legacy, the *Uttarayan*, his loved garden, and the huge number of his works and contributions to art, literature and culture. It was of utter necessity to upkeep and to preserve them. His father's death left Rathindranath in dilemma between personal desire and public welfare. At last, being inspired by the zeal of public welfare he assumed the role of collector, conservator, and administrator. We can see that Rathindranath was a collector, preserver and conservator when he was thirteen years old. During this period his mother Mrinalini Devi passed away. When all the mourners leave, Rabindranath gave the pair of shoes that Mrinalini Devi used, to Rathindranath and asked him to keep it in his possession. We can still see this shoe pair displayed in Rabindra Bhavana. During year 1921 when Visva-Bharati was founded we can see Rathindranath in the role of preserver. *Gurudeva* was never very concerned about the preservation of his original manuscripts right from the very beginning of his writing career. Whenever he encountered requests from friends and relatives to provide them or present them with the gifts of his manuscripts, the poet never hesitated in giving away his manuscripts to them. Those of them who took care of the manuscripts, from them these manuscripts were retrieved later through various means for the purpose of preservation. In this connection it may be stated that a relative of Rabindranath, Indira Devi had a number of letters written to her by *Gurudeva* from various places like Kaligram, Orissa etc., she edited and omitted all the personal elements from those letters and copied the rest in two notebooks and presented it to Rabindranath. Rabindranath, after editing a few letters from those two books published them

under the title of "*Chinno potro*" in the year 1912. Later on the occasion of Rabindranath's hundredth birth anniversary a revised and elaborated version of these letters were re-published in the year 1961. After the foundation of Visva-Bharati (1921) Rathindranath also was much concerned to upkeep the original manuscripts of his father. Before sending any manuscript to press for publication, he tried to send the copies or copy of those manuscripts to the press and preserve the original one. When *Gurudeva* won the noble prize, it was Rathindranath who took the initiative and became a member of the international press cutting bureau so that he could preserve all copies of those news published relations to *Gurudeva* from those newspapers published in various countries of the world.

Mission continued even during 1941, the year of *Gurudeva's* demise. We have noticed the fascinating work of Rathindranath as an administrator and collector in the December edition of Visva-Bharati news of 1941. We can see Rathindranath issuing a press release where he expresses his gratitude and extends his thankfulness to all those who contributed or donated materials related to Rabindranath Tagore. In this context he also informed that in Santiniketan a special Rabindra centre was being created which would contain his own collection of photographs, manuscripts, paper cuttings, journals and such other personal things, which he would donate. He also made request for any such donation from people who had anything related to Rabindranath.

Through this press release we can see that Rathindranath was deeply contemplating the idea of scientifically setup a museum. In his mission and vision to create a museum he believed and followed in the principle that we can see the materials of Rabindra-Bhavana which were subsequently classified and arranged in terms of subject.

Again we have seen from a report published on **11th April 1942** in the Bengali newspaper **Anandabazar Patrika** that Rathindranath Tagore has decided to donate his all personal collections pertaining to *Gurudeva* to the Visva-Bharati. These collections comprised of letters written by *Gurudeva*, large number of manuscripts, books etc., he has decided to preserve them on the southern section of *Udayan* house where *Gurudeva* spent the last years of his life.

The annual report of 1943, with Rathindranath as the General Secretary or *Karma Sachiva*, states that the southern portion of *Udayan* house officially becomes a Tagore museum from 1st July 1942. Seminars pertaining to Rabindranath were being organised. The various editions of different books of Rabindranath were being sorted out and a catalogue was being made. Necessary measures were also being taken for the preservation of Rabindranath's manuscripts. Besides these, fellowships and scholarships were also arranged to pursue study and research on *Gurudeva* as Rathindranath wanted this place to be helpful and easily accessible for researchers on Rabindranath Tagore. That is why Rathindranath donated from his own personal collection, various materials like important manuscripts, letters, photographs, to the museum. A sub-committee was created for the purpose of

development and functioning of this museum. In the first meeting of this committee held on 17th August, 1942, it was decided that a comprehensive list of collected items should be made and preparations are made for creating a congenial atmosphere of research. Then *Malati* from Delhi's Lady Irwin School donated a valuable manuscript to Rabindra Bhavana. This manuscript was thus named as *Malati* manuscript in accordance with her name. This is considered one of the oldest manuscripts of Rabindranath Tagore which contains his oldest signature which was dated between 1878 and 1882. On Rathindranath's behest a copy of this manuscript was prepared and to preserve the original document it was sent to Delhi for microfilming and each page of this manuscript was covered with tissue paper and properly preserved and brought back to the museum. So as a result of all these activities Rabindra-Bhavana became a centre of excellence specially and for editorial and literary work.

The movement further accelerated and in November 1942 this museum was first named as Rabindra Sadan, and it remained opened for public to visit the museum from 8 am to 12 pm in the morning and from 6pm to 8pm in the evening. A scheduled has been prepared to keep open the museum for providing access to the museum.

Rabindra-Bhavana appointed a curator and first curator of Rabindra Bhavana was Gurdayal Malik. Shovanlal Gangopadhy joined in as deputy curator from July 1944. In the very same year Chittaranjan Deb also joined in the service of Rabindra Bhavana. Kripalini became the first Director of the museum in the same year. Although Gurdayal returned to the museum as curator after long absence of three years, he failed to perform permanently. He resigned on February 1947, and Prabodh Chandra Sen became the new curator.

We came to know from the writings of Gurdayal Malik we can see that the gracious gifts of Rathindranath transformed Rabindra Bhavana from a storehouse to a temple of light and this stands in accordance with the principle on which museums are defined now as per ICOM, a museum as centre of non-formal education. So this museum became not only a non-profit making educational research centre but also a means of entertainment and enjoyment as well as a prime centre of research and development. Mention may be made here of Patrick Geddes who deemed Rathindranath as an ideal person for experimental science. Rathindranath was truly an ideal person in the sense that in contemporary globalised village and expertise he took as museologist and shaped the museum in accordance with the modern concept and development of the domain of museum, these are still followed by Rabindra-Bhavana. The introduction of hi-technology specially information technology has enriched the museum. Presently, Rabindra Bhavana is a 1st designated biographical museum and 2nd University museum of India.

After the foundation of Rabindra Bhavana, Rathindranath Tagore collected materials for the museum and following the footsteps of others. This trend of collection of materials to augment present collection is a continuous process and now museum is thick in activities.

Rabindra-Bhavana enriched its collection by accepting gift objects. The first gift from a foreigner to Rabindra-Bhavana was from Audrey Carpelish on December 1947, who presented the letters written to her and her husband from Rabindranath. In 1950 the French citizen Madam Rollan presented the letters written by *Gurudeva* to the French intellectual Roman Rollan. In the year 1953, the letter written by *Gurudeva* to William Rotenstein as well as the microfilm of the manuscript of *Gitanjali* gifted to him by *Gurudeva* were collected in the museum. Rathindranath Tagore donated many objects in the year 1953 to further enrich the museum which are as follows:

- ▶ The manuscripts of hundred and two essays published in Bengali.
- ▶ More than thousand paintings of Rabindranath Tagore.
- ▶ Hundred and fifty letters written to Rathindranath by Rabindranath and also a number of letters written to kinsmen.
- ▶ A few hundred letters written to Rabindranath Tagore from contemporary known and unknown personages.
- ▶ More than 400 photographs of Rabindranath in different ages.
- ▶ The golden memento of the Noble prize and diploma, as well as several gifts from Japan and China, and all the nations that he visited and all the things that he received in those countries.
- ▶ 50 volumes of newspapers and journals published various news pertaining to Rabindranath.
- ▶ Various prints of Tagore's publications in Bengali and English languages.

Rathindranath pursuing to make the Rabindra-Bhavana a centre of research. In an attempt Rathindranath wrote a letter to Satyajit Roy on 22nd April 1960, he wrote from Rajpur in Dehradun. It is revealed from the letter that Rathindranath had given everything in his possession pertaining to Rabindranath. On 13 April 1960, Satyajit Roy even after working for almost one month in Rabindra Sadan for the purpose of making a documentary for Central government, enquires Rathindranath about the existence of any relevant material. Rathindranath immediately, replied to him informing about Rabindra Sadan.

Although Rathindranath left Santiniketan on August 1953, he was very much concerned for the proper functioning of Rabindra-Sadan. There are member of correspondences between him and his niece Nandita. During 11th September, 1953 he asked Nandita to donate all the letters of Tagore kept in her possession to Pulin babu of Rabindra Sadan.

He was also very anxious about the security system of the museum. In a letter written on 18th July 1955, to the brother of Pratima Devi, Kalidas Chattopadhyay, where he expressed his concern over the security arrangements in Rabindra Sadan. In the letter he expressed his desire to hand over the two expensive watches and a casket belonging to Rathindranath to Nipen babu so that he could keep it in a safe deposit in bank. He was not satisfied about the security arrangements in Rabindra Bhavana.

There are number of correspondences where he expressed his concern about the proper upkeep of objects. It is evident from a letter written to Kalidas Chattopadhyay dated 2nd August, he stated that Nipen babu had asked Annada babu to purchase a small steel trunk in which he could keep the valuables which he would then place in a safe deposit in bank and that it would be better right now to keep the valuable materials.

The man for whom Rabindra Bhavana, Santiniketan, Sriniketan came into being, and he took the leading role to make tangible and intangible heritage transformed into a living museum, but unfortunately his own creations like paintings, leatherwork, and other works are languishing in one corner of the Rabindra-Bhavana. He created the *Guhaghar*, the rose garden, the Japanese garden, the Mughal garden, sculptures and various architectures were reticently carrying the principle of Rathindranath's life force- born in an atmosphere of art and culture, educated in the discipline of science, he worked continuously for the welfare of populace. His memory has remained as a service to his love for his father. But he remains as the unsung hero. This is the high-time, when the Governor of West Bengal inaugurated a museum on Rathindranath on the occasion of his hundred and twenty fifth birth anniversary and this museum stands as a token of acknowledgement of Rathindranath's worth and value.

References

- Das, Anathnath (Ed.). (1988). *Tagore Rathindranath, Janma Satabarsa Purti-Sadergha*. Kolkata: Visva- Bharati Granthana Bivaga.
- Tagore, Rathindranath. (1958). *On the Edges of Time*. Kolkata: Visva-Bharati Granthana Bivaga.
- Tagore, Rathindranath. (1973). *Pith Smriti*. Kolkata: Jigasa.
- Kramrish, Stella. (1948). 'Introduction' Tagore. New Delhi: All India Fine Arts and Craft Society.
- Mandal, P. K. (2005). *Rabindra-Bhavana Sangrahasala, Santiniketan*, Journal of the Dept. of Museology, Kolkata: University of Calcutta.
- Visva-Bharati Bulletin, No. 32, January, 1951.
- Banerjee, Arunendu. (2011). *Rathindranath Tagore*. Kolkata: Pachism Banga Bangla Academy.
- Lala, Nandini. (1988). *Pita-Putri*. Kolkata: Ananda Publishers.
- Mallik, Gurdial. (1942). *Rabindra Museum*. Visva-Bharati News. Vol.XI. No.11.
- Tagore, Rathindranath. (1941). *Santiniketan and Sriniketan*. Visva-Bharati News. Vol.X. No.6.

Revisiting P.C.Mahalanobis Memorial Museum & Archives

KRISHNA BHATTACHARYA

Prasanta Chandra Mahalanobis Memorial museum & archives began its journey on 29th June 1993 on the occasion of the birth centenary celebration of Professor Mahalanobis. It is located at his residence 'Amrapali' within the present premises of the Indian Statistical Institute on B.T. Road, Kolkata.

Prasanta Chandra Mahalanobis was born in a well known Brahmo family of Calcutta. At that time the section of Bengalis in Calcutta (Kolkata) which came to the forefront in the assimilation of the Western scientific outlook was the Brahmo community. The family background and the contacts young Mahalanobis had with great intellectuals and social reformers of Bengal had shaped the Professor as he was popularly known for the active life he was to lead his death on 28th June 1972, at the age of 79. It is said that Mahalanobis was a physicist by training, a statistician by instinct and an economist by conviction. Prasanta Chandra Mahalanobis started his career as Professor of Physics at the Presidency College Calcutta, and taught physics for over thirty years. He is one of the pioneers who laid the foundations of statistics as a separate discipline. His main contributions to statistical theory and applications are multivariate methods in taxonomy known as Mahalanobis distance, optimum design of large scale sample surveys, and use of econometric models in planning. His flair and fascination for statistics led him to found the Indian Statistical Institute (ISI), in 1931 to train statisticians and promote research in statistics, which soon acquired international reputation for its educational and interdisciplinary research programme. The Institute was declared as an institute of national importance in 1959 by the Government of India. Mahalanobis was also responsible for organizing and developing the Indian National Statistical system which is considered to be one of the best in the world. He considered statistics as new technology of the present century which can be applied to any field of human endeavour, and suggested that statistics should be collected in a planned manner keeping the purpose in view.

In 1940, Mahalanobis purchased a plot of land, with an one storied building, which was once the garden house of a wealthy landlord of 19th century Kolkata at the northern outskirts of the city on Barrackpur Trunk Road. Mahalanobis had a long and close association with Rabindranath Tagore. The poet named the proposed house as Amrapali to evoke the ambience of a classical Buddhist sanctuary. Both Mahalanobis and his wife Nirmal Kumari had the earnest desire

that the poet would visit their new house and stay there. Unfortunately the poet passed away before the house was completed. Tagore's great influence on the life and thoughts of Mahalanobis was reflected even in the design of Amrapali. In the structure of the facade at different levels, Amrapali with its idyllic environment shows much resemblance with the Udayana building in the Uttarayan complex at Santiniketan. Renovation of Amrapali was completed sometime in the later part of 1941 and Mahalanobis came to stay at Amrapali. Consequently, the centre of activities of the Institute moved from the premises of Presidency College, Kolkata to Amrapali. It remained so till 1951, when the research and Training School (RTS) building, now known as Ronald Fisher Bhavan, was constructed. *Amrapali*, the home of Prasanta Chandra and Nirmal Kumari became nest of statistical research in India and a meeting place of great minds across the world. Mahalanobis received here as guests R.A. Fisher, W.A. Shewhart, Frank Yates, Norbert Weiner, A.N. Kolmogorov, J.B.S. Haldane, Neils Bohr, P.M.S. Blackett, J.D.Bernal, Frederic and Irene Joliot-Curie, Charles Bettelheim, Jan Tinbergen, Ragnar Frisch, Joan Robinson, Julian Huxley and many other luminaries. Jawaharlal Nehru came to visit Amrapali on several occasions. According to the last will of Prasanta Chandra Mahalanobis, Amrapali was donated to the Brahmo Samaj. After the death of his wife Nirmal Kumari Mahalanobis, the Brahmo Samaj became the owner of the building. To pay homage to the memory of its founder, the Institute (purchased the *Amrapali*, which stands out as an old heritage building from the Brahmo Samaj) set up the museum and archives at Amrapali, which stands out as an heritage building there during the birth centenary celebration of Prasanta Chandra Mahalanobis, as mentioned earlier.

The primary concerns of the museum and archives have been the collection, preservation, restoration and documentation of the rare source materials in order to interpret the life and legacy of Prasanta Chandra Mahalanobis, along with the depiction of historical growth of the Institute and the statistical science in India and at the same time, preserve and maintain, the historic structures and features of the site. The archives contains the source material for early work of the statistical science and the growth of ISI. It also includes Prasanta Chandra and Nirmal Kumari's personal letters, manuscripts, diaries, notes, photographs, dresses, and othervaluable items. The museum has now five galleries, on the ground floor, each depicting the distinct phase of the life and work of Professor Mahalanobis through the numbers of photographic display.

To begin with Prasanta Chandra's family background, the ambience of the age in which he was born and brought up, his education in India and abroad are brought into focus in the first gallery. One can have glimpses of shaping up of a great mind through the personalities with whom he came into contact in his childhood and students-days.

The display in the second gallery depicts how Mahalanobis was initiated to the discipline of statistical science. Glimpses of the history of statistical system in India which dates back as early as the Maurya period and continued in the Mughal period and the British period, has been depicted through small dioramas. Prasanta Chandra Mahalanobis, who began his career as an Assistant Professor of Physics in the Presidency College, Kolkata, set a voyage of self-discovery to explore the domain of statistical science. From the formulation of path breaking theory of D^2 statistic, also known as Mahalanobis distance, the photographic presentation captures gradual evolution of his pioneering researches on statistical application, such as in the sphere of rainfall and flood control, intelligence quotient, anthropometric study, survey on the Bengal famine, agricultural field trials, the breakthrough in sample survey system, introducing statistical quality control movement in India, the making of first electronic computer in the country, and drafting of crucial Second five year Plan as well as many other innovative studies, including excavation of the fossil of the first dinosaur in India. The pivotal initiative of Professor Mahalanobis in establishment of Indian statistical Institute (ISI) as a premier centre of research and training in theory and application of statistics, implementation of national sample survey process for national planning, his recognition as the Fellow of the Royal Society of London, the shaping of the official statistical system in India, and the subsequent recognition of ISI as an 'Institute of National Importance' by the Act of the Parliament – all the distinct landmarks in the life of Professor Mahalanobis are highlighted in this gallery.

Since the beginning of the 19th century, Bengal witnessed a steady growth of rekindling of interest in the various phases of her own thought and culture in the context of the newly acquired contact with the western philosophy and the culture. The pioneering attempt was made by Raja Ram Mohun Roy to reform and revitalize the national life of his countrymen. Gurucharan Mahalanobis, the grandfather of Prasanta Chandra played a crucial role in establishing the Sadharan Brahmo Samaj, which later became a distinctive landmark of the social reform movement in the 19th century Bengal. In the third gallery, as a young heretic in the Brahmo Samaj, Mahalanobis and his gifted friend, Sukumar Ray, would be found raising a storm at the Samaj in order to include Rabindranath Tagore's name as the honorary Secretary of the Brahmo Samaj, which was opposed by the spiritual obduracy of the Samaj elders. Prasanta Chandra's marriage with Nirmal kumari, in the presence of Rabindranath Tagore forms another aspect of Prasanta Chandra's eventful life presented in this gallery. The book signed by Raja Rammohun Roy and the small painting (water colour) by Abanindranath Tagore as wedding gift to the Mahalanobis by the article himself are among the valuable collection.

In the next gallery one can explore the all embracing influence of Rabindranath Tagore's creative thoughts and humanist philosophy permeating the sensitive mind of Mahalanobis – his initial visit to santiniketan and his organizational involvement

with the poet's 'Visva Bharati' as joint secretary for ten long years and his crucial and abiding presence when Rabindranath renounced the knighthood as a mark of protest against the Jalianwalabag massacre. The gallery also depicts Mahalanobis, the scientist, emerging in the role of a litterateur, accompanying Tagore to Europe and staying close to the ailing poet during his last days. The book signed and presented by Albert Einstein to Mahalanobis and the manuscripts of some of Prasanta Chandra's work on Tagore's writing are among the interesting displays of this gallery.

The theme of the fifth gallery is how Mahalanobis worked for the advancement and application of statistics as a 'key technology'. He made extensive tours of several countries around the world like the scientific ambassador of India. Resultantly, the visitors who came to the Institute from time to time, ranged from Nobel laureates to Fellows of the Royal Society, from stalwarts in economics to legendary political personalities and eminent men of letters as mentioned earlier. Mahalanobis received numbers of awards for his contribution to the statistical science from India and abroad including Fellow of the Royal Society, First foreign member of the USSR academy of Science, Deshikottama, Padmabibhusan and many others. The display in this gallery ends with the last days of Professor Mahalanobis when he breathed his last on 28th June, 1972. In the audio biosk Visitor can hear selected recorded speech delivered by Mahalanobis and other eminent persons on several occasions at ISI.

Our journey now moves towards the up stair where Mahalanobis received his guests now displayed as period room with furniture used by him. A large pencil drawing by Nandalal Bose from the personal collection of Mahalanobis, who had a great liking for work of art and the artists is one of the valuable displays. Besides the large drawing, two rare sculptures on stone belonging to the 9th-11th century A.D. identified as 'Hari-Hara' and 'Maitreya', and one colour drawing of Prasanta Chandra by Mukul Dey, an eminent artist from Santiniketan, are also displayed here from the personal collection of Mahalanobis.

In a large four storied building like Amrapali the space occupied in the extended part of the first floor by Professor and Mrs Mahalanobis for their living purpose, 'the residence', seems to be rather small in proportion. The idea of space utilization to the utmost capacity was followed in the treatment of every room and in the selection of furniture and interior fittings. The unfailing beauty in the simplicity of his lifestyle would only evoke one's imagination and admiration for a great personality and his philosophy of life.

The virtual tour of the museum can be made at the website of the Indian Statistical Institute - www.isical.ac.in. It is also available through the Google map.

A new gallery on Rabindranath and Prasanta Chandra is now in the making in the rooms which was once planned for Tagore's visit by Mahalanobis.

Earth Exploration Hall, Science City: a live text book of Geography

JUTHIKA BISWAS

Introduction

Over the centuries museums are being a part of our society. They have changed their definition with time. Their collections and displays are also changing with their roles and functions to the society. Nowadays, Science Museums and Centres are redefining their collections, displays and functions. They are more enabling and interactive to the public to explore exhibits, display techniques, learning, enjoyment and entertainment.

Science City, Kolkata is the largest science centre in the Indian subcontinent under the National Council of Science Museums (NCSM), Ministry of Culture, Government of India. It is situated at the crossing of Eastern Metropolitan Bypass and J B S Haldane Avenue, Kolkata. In the year 1997, it was opened for public.

Attractions

Main attractions of the Science City are its different galleries. It comprises six galleries with hands on, live and theme exhibits. Galleries are :

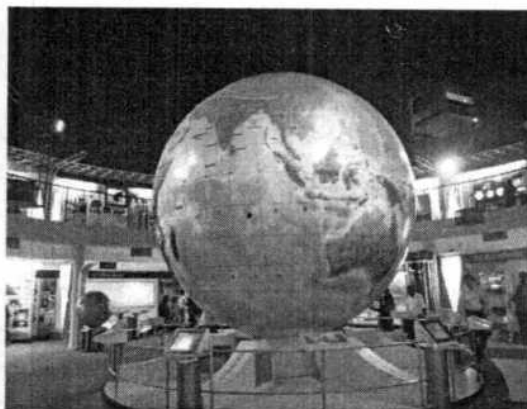
1. **Dynamotion Hall** contains hands - on interactive exhibits with Illusion, Power of 10, Science show, Nano technology, Fresh water aquarium and Life butterfly gallery.
2. **Space Odyssey** houses Space theatre, Mirror magic, 3-D show, Time machine, exhibits on time and space and games.
3. **Maritime Centre** exhibits maritime history of India, artefacts, dioramas and interactive exhibits on shipping and navigation systems.
4. **Evolution Park** describes the evolution of animal life.
5. **Earth exploration hall** shows the different geographical aspect of earth.
6. **Science exploration hall** is an upcoming gallery on science.

Besides these galleries, Science City has a beautiful science park, which includes different types of exhibits on physical science along with birds, flower, bonsai, cactus and a wonderful musical fountain.

The Science City also arranges a sky observatory programme for its visitors in evenings.

Earth Exploration Hall

It is the farthest gallery of Science City. It was inaugurated on 6 December 2008 by Ambika Soni, the then Union Minister for Culture, India. It is a two storied hemispherical building. It displays Southern Hemisphere in the ground floor and Northern Hemisphere in the 1st floor. At the centre of the hall a large globe displaying the earth surface, surrounding by some computer kiosk. The kiosks are with touch screen computer, serving some information on our environment and such interesting game on it. The gallery is divided into 12 segments along the longitudinal extension to depict the earth surface. The gallery describes the geographical features, like – physical geography, lands and its people, flora and fauna, natural resources (minerals, ores, etc.), crops and other salient features of those area displays by the modern display technologies, such as attractive visuals, interactive multimedia, video walls, panoramic videos, tilting tables, computer kiosks and 3-D effects theatre wearing a special Polaroid spectacle.



Photographs are showing exhibits of the Earth Exploration Hall. The globe at the centre

Ground floor

This floor displays Southern Hemisphere i.e., southern part of Equator. From the left hand side of the entrance the hemisphere starts with 0° east longitude and the segment ends with the 30° east longitude. The each and every segment of that 12 segment displays 30° longitudinal area (e.g., 0° - 30°; 30° - 60°; 60° - 90°; 90° - 120°; 120° - 150°; 150° - 180° and reverse). At the right hand side of the entrance the circle completed at 30° - 0° west longitude. Mainly panel displays are being used to describe the exhibits. Exhibits display the political map of those area or countries which are fall in to that longitudinal extension, name and national flag of those countries, geographical features, flora and fauna, natural resources (mineral and ore) found on those countries, crops they cultivate, physical or cultural land mark, etc. These are describing in a lucid language accompanied with beautiful photographs. A comparative exhibition on the volcano is wonderfully displayed.

The exhibit displays the cross section of volcano to show the inner portion and formation of it. A projection shows an active volcano. An earthquake platform of this floor is attracts many visitor to feel a tremor what earthquake could. The platform is operating by a switch and it vibrates to create a tremor for several minutes. A video displays and some models are depicting the mechanism and effects of earthquake. A 3-D show is arranged on depending on the visitors interest and gathering. The author saw a 3-D show on "*The Pacific Ring of Fire*" in 2010. A showcase is showing the mechanism of tornado. At the centre of the hall beside the globe a few exhibits are depicted the sea floor spreading and formation of volcano under the sea.

First floor

This floor displays the Northern Hemisphere, i.e., the northern part of the Equator. This floor is also displayed in the same manner as the ground floor. Here also the exhibition starts at the left hand side from the entrance and begins with 0° - 30° east longitudinal extension and end with 30° - 0° west longitudinal extension in the right hand side. In this floor some tilting tables are place for visitors' attraction. Visitors can see their desire places by tilting the table. Some scrolls are use to display the information of some geographical features. A show delivered on the geological specimens (e.g., fossils, rocks and minerals) and events (e.g., formation of mountain, rift valley etc.). Visitors can touch the specimens and can try to identify those.

Impacts on visitor

The hall covered a range throughout the geography syllabus, which is being thought in school level. So, the students like to this hall. They enjoy the learning without any books. The main target visitors of this hall are students. A lot of school students visit the Science City, single or in group. They visit the gallery with their teacher and / or the education trainees as guide. The guide explains the gallery to them. Students are like to spent time in this gallery. They wonder that what they read in text books, are displays here. They can easily understand the type and formation of volcano from the exhibit. They can also feel the tremor of earthquake. The display patterns with longitudinal segments are more attractive to both the teacher and students. The each segment provides the necessary information and photographs about the earth surface of that longitudinal extension, easily learned by the students. Visitors except students, who like geography in their school or college life are also, express their fondness to this hall. The photographs of the hall are representing the subject in a lively form.

But there is a major problem with the labelling and description of these galleries. The exhibits of this hall are describes in English. Most of the students are from rural areas of Bengali medium schools, so, they have a problem with English. The panel display contains too much write up to read patiently. So, the students lose

their concentration and move forward faster. The visitors from rural area are not so much interested to read the description.

Conclusion

Science museums and centres are more effective in the field of education. They are very helpful and encourage the visitors in informal learning. The Earth Exploration Hall of the Science City is an exceptional gallery among the science museums and centres in India. It can raise an interest among the visitors, who do not like to read the geography text book at all. It can help those, who know a little about geography. So, more galleries like this should be increased for the benefit of students.

Reference

Ghosh, Pratik (2012). Museum – Unique learning environment for secondary science education, Journal of Indian Museums, Vol. LXVI. New Delhi: Museum Association of India.

Welcome to Science City, Kolkata. (n.d.). <http://www.sciencecitykolkata.org.in>. (retrieved on 21 June 2013)

Science City Kolkata, (n.d.). http://en.wikipedia.org/wiki/Science_City_Kolkata. (retrieved on 21 June 2013)

A New Museological Paradigm – A Brief Concept of Planetarium and the Case Study of M.P. Birla Planetarium, Kolkata

MOUSRUTI DAS

The splendor of the night sky has been fascinating man from time immemorial. Beside the stars, of which the Sun is our nearest one, the Moon and the planets greatly stirred up man's curiosity. Imaginative minds could figure out constellations and noticed the movements of the planets and stars from which a mental picture of the Universe gradually evolved. However, observational astronomy, the oldest of all sciences had its foundation firmly laid around 1610 A.D., when Galileo Galilei, have constructed a telescope himself using lenses, and started scanning the sky. With his telescope, he first detected sun-sports, moons of Jupiter, rings around Saturn and the like. Subsequent development of bigger and bigger telescopes of both refracting and reflecting types, spectroscopes and improved photographic techniques over the centuries enriched astronomy enormously, and gradually has turned out to be one of the major pursuits of our time.

The serendipitous discovery of extraterrestrial radio waves by Karl Jansky in the early thirties ultimately gave birth to the new science of Radio Astronomy. This opened up a new frontier : study of the Universe through radio waves (from 0.1cm to 20 metres) emitted from different celestial objects. The two astronomies – Optical and Radio from the earth based observatories could develop because of the fact that the two wavelength ranges (optical and radio), can pass through the atmosphere. With the advent of space probes and artificial satellites the so called Space Astronomies – IR, UV, X-ray and Gamma Ray – developed. Since the sixties a new dimension to our knowledge of the universe has thus evolved. For satisfying the popular interest of knowing the heavens, a special projection device, housed in a suitable dome, named Planetarium, has been in use for many decades. It serves the purpose of providing astronomy education to the general public, amateurs as well as serious students.

A science Museum is a museum devoted primarily to science. Older science museum tended to concentrate on static displays of objects related to natural history, heritage and cultural heritage, paleontology, physics, astronomy, geology, industry and industrial machinery etc. Modern trends in Museology have broadened the range of subject matter and introduced many interact exhibits. Planetarium is related

to astronomy and a special projector by means of which the positions and movements of stars and planets can be projected on a hemispherical domed ceiling in order to stimulate the appearance on the night sky to an audience seated below. The display technique and the exhibits are different from the old traditional science museum. Thus a planetarium covers a broad spectrum of sciences and this is open to the public for the purposes of study, education and enjoyment. M.P. Birla Planetarium, Kolkata fits this bill.



The *Birla Taramandal* or M.P. Birla Planetarium in Kolkata started functioning from September 29, 1962 and was formally inaugurated on July 2, 1963 by the first Prime Minister of India Pandit Jawaharlal Nehru. The second major planetarium to be set up in the commonwealth countries with London being the leader by margin of few years, the M.P. Birla Planetarium is the first of its kind in India and the largest in Asia.

Its roots, however can be traced to the aspirations of a young nation after a newly gained independence – a nation which looked forward to a identity of its own, to do something impressive. Pandit Nehru's vision of a modern democratic self-sufficient developed India reflected in his emphasis on industrialization, specially heavy industries. This necessitated a development in Science and Technology Institute of higher learning with provisions for basic and fundamental research were set up. But scientific research and academic endeavours need not remain an exclusive domain. Public outreach programmes were imperative to make science and technology much more popular and broad based. Scientific knowledge needed to be disseminated through mass communication. Fortunately, the Govt., Industrialists and the erudite fraternity joined hands.

Prof. R. Subramanian, as a Fulbright, Research fellow in the United States in 1954-55, came in contact with eminent scientist Sir K.S. Krishnan, who was the Director of the National Physical Laboratory (NPL) in New Delhi. This meeting resulted in Subramanian changing his *métier* to science museums and science

popularisation. Soon after his return to Madras (now Chennai) in 1958 he moved to the NPL.

The NPL had good facilities and Krishnan was enthusiastic about starting a science museum. Subramanian marshaled all the available resources to put together exhibits to set up the planetarium as a science museum in the country. In 1959, he devised a fascinating exhibit that told the story of Indian civilization and the growth of science in India. It had commentary synchronized with lights that lit up relevant areas on a map of the country. The visitor could have the commentary in English or in Hindi. Another exhibit was a small planetarium, under an improvised dome, at a time when space as a new frontier had captured the imagination of scientist and layman alike. Even when he was in charge of the Chemical Conservation laboratory, Subramanian had experimented with a toy planetarium. The ceiling of a small, darkened room came alive with a multiplicity of dots of light, which passed for stars.

The Planetarium he set up in the NPL was a Zeiss instrument, which could be demonstrated to 40 persons at a time. It caught the attention of visitors to the NPL & students, who would throng the dome to watch the stars & planets in action. Subramanian's planetarium attracted the attention of the late M.P. Birla who wanted him to set up one in Kolkata. In 1962 Subramanian came to Kolkata. The idea for setting a Planetarium in Kolkata was appreciated and actively supported by the then chief minister of West Bengal Dr. Bidhan Chandra Roy who was enthusiastic about the planetarium. He made arrangement to lease out about an acre of land in the prime central part of Kolkata. The architectural firm, Ballardie Thomson Matthews, designed the planetarium building; J.K. Gora was the architect who constructed the building. In September, 1962 it started functioning and in 1963 Prime Minister Jawaharlal Nehru formally opened it to the public.

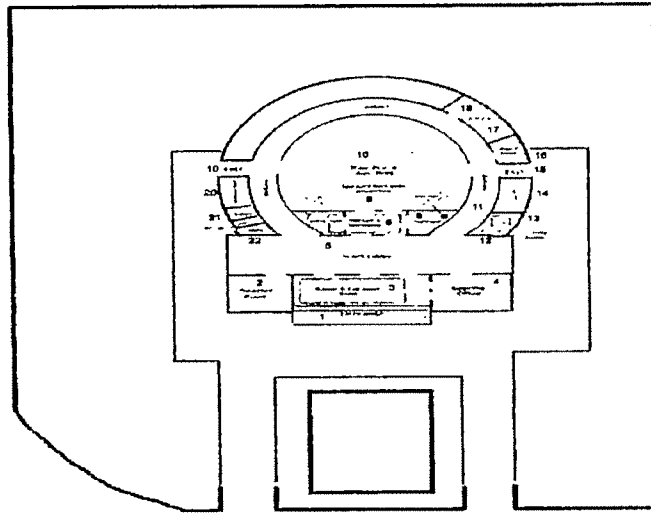
Purposes

The M.P. Birla Planetarium, Kolkata was intended to serve the purpose of educating and entertaining people. It is to provide a community a place where people can enjoy a guided journey of exploration through the vast cosmos to which we all belong. Never before have we acquired new information about the Universe as quickly as we do now. Yet, at the same time never has the general public been so ignorant about even the basic facts of celestial science. The educational aspects of the planetarium is being enhanced by the ability of the stimulating planetarium environment to inspire enthusiasm for science; awe at the marvels of the universe; and new perspectives on our world and civilization.

With the passage of time the purpose of M.P. Birla Planetarium, Kolkata has widened. Since its inception, has designed and presented to the public and students more than 302 astronomical projects dealing with many facts of astronomy, astrophysics, celestial mechanics, space science, history of astronomy as well as mythology concerning with stars and planets.

Where and how it looks

96 Jawaharlal Nehru Road, Kolkata- 700071 is the postal address of M. P. Birla Planetarium. The area once called Chowringhee is located centrally and is easily accessible from different parts of the city. Facing towards the Citizen Park with its splendid light and sound show. A little distance away is the greenery of the famous Maidan further down is the Victoria memorial.



- | | |
|--|--|
| 1 - Entrance | 12 - A.C. Plant |
| 2 - Director General's Room | 13 - Cooling Tower |
| 3 - Blower and Compressor Room | 14 - Quarters for Scientific Materials |
| 4 - Booking office and Accountance Office and Office of the Director | 15 - Exit |
| 5 - Front Lobby | 16 - Board Room |
| 6 - Storage and Workshop | 17 - Class Room |
| 7 - Control Room | 18 - Library |
| 8 - Staircase | 19 - Exit |
| 9 - Special and Slide Panoramic Projectors | 20 - Seminar Room |
| 10 - Main Projector and auxiliary projector | 21 - Electronic Lab |
| 11 - Exhibition Gallery | 22 - Toilet |

Designed by the reputed architectural firm, B.T.M. and constructed under the supervision of architect J.K. Gora the single storied, circular planetarium building is tune with the traditional Indian architectural style. The central dome has a dimension of 23mt. inside diameters is 19mt. shaped in imitation of the Buddhist *Stupa* at Sanchi. The marble building is surrounded by beautiful garden with seasonal flowers always at bloom. The entrance gates are decorated with twelve signs of the zodiac.

In addition to the main sky theatre containing the Planetarium Projector which can project the sky of any place on the earth of any given time, there is a gallery full of astronomical exhibits and busts.

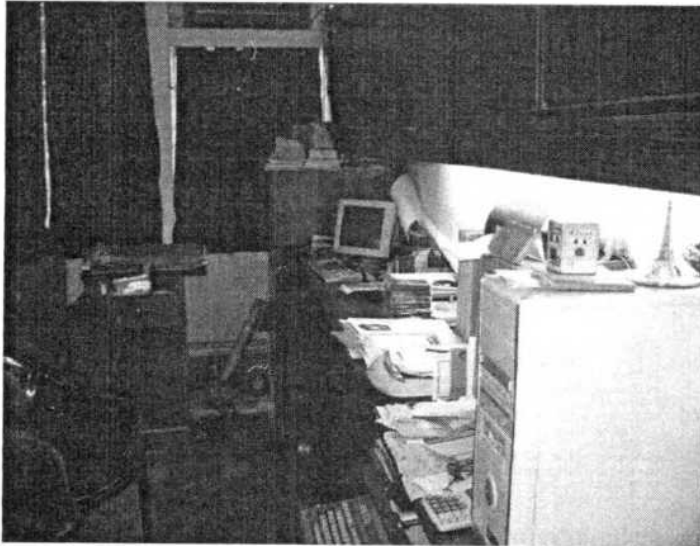
The large front hall or the 'lobby' is a unique experience. It is decorated with many astronomical exhibits, colourful enlarged photographs. The marble walls are decorated with the inscriptions of Vedic Slokas. A large colourful photograph of the 'Horse Head Nebula' is set on the wall – just above the entrance door of the sky theater. Two bronze statues of guards of medieval era carrying flaming torches stand by both side of the entrance door.

Technological Support

A planetarium requires advanced technical support. The M.P. Birla Planetarium, Kolkata started off with a Planetarium project from Zeiss of Jena, Germany, a leading

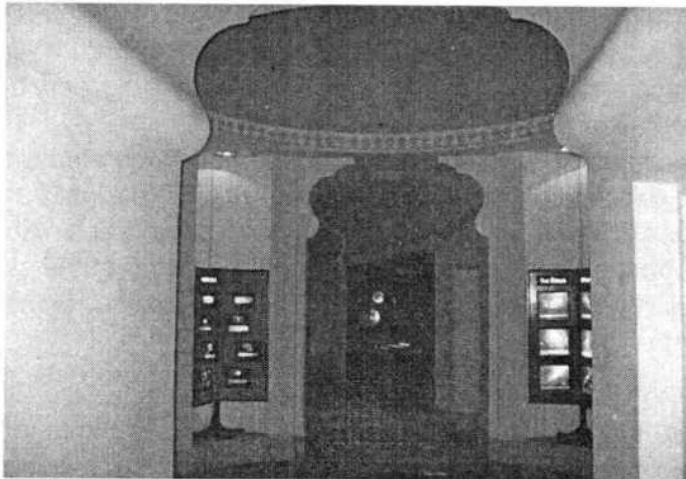
manufacturer of such projector. The projector was brought to Kolkata, section wise and assembled here by experts who were sent to Zeiss for comprehensive training in assembling to subsequent maintenance of the highly complex machine. The name of the machine is Carl Zeiss Universal Planetarium Projector.

In 1982 an improved electronic control system and electronic voice synchronization were made operative.



The Planetarium is equipped with an Electronics lab for design and fabrication of scientific equipment. In 1993 this lab has set up and automation system for executing the special effects and visuals during a Planetarium show. In connection with this 22 projectors including LCD projectors and special effect projector. The astronomical observatory is equipped with a fully

automated and computerized Celestron C-14 Telescope with accessories such as ST6 CCD Camera, Solar Filter etc. This telescope has a tremendous potential in producing from level research grade observations.



Lighting

The Planetarium is lighted with the artificial light. The show hall is fully dark and the gallery is lighted with the spot light and also back lit.

Its Offerings

Display of exhibits:

Without a tour of gallery the visit to the planetarium will not be completed the busts of astronomers on whose shoulders stand the entire edifice of modern astronomy. They are : Vedvyasa (8th cent. B.C.), Panini (6th Cent. B.C.), Plato (427-347 B.C.), Aristotle (384-325 B.C.), Patanjali (2nd Cent. B.C.), Aryabhatta (476-520 A.D.), Copernicus (1473-1543 A.D.), Tycho Brahe (1546-1601) and Newton (17th Cent.) Einstein, Eddington, M.N. Saha (19th -20th Cent.) etc. Some photographs are kept in the gallery Karl-Schwar-Zschild observatory. Tautenbury – Crab Nebulae NGC 1952. Voyager photographs of Jupiter with IO and Ganymeda Crossing the disc. Just beside these exhibits there is a computer (one place the Universe) in the gallery which shows some important information about Universe. Model of M.P. Birla Planetarium is displayed in the gallery. Some attractive photographs are kept in the gallery.

Modes of Collection of the exhibits:

Mainly the exhibits are gifted by some Planetarium or some Universities or Colleges. Photographs of Aurora are also gifted. This photographs has been gifted by Tokyo University Research and Information centre. The colour map of the Northern Heavens is gifted by Havard college observatory. M.P. Birla Planetarium, Kolkata downloads some colourful images from the internet and displayed. Paintings are drawn by the artists who are attached to the M.P. Birla Planetarium authority. The model of Indian Satellite is presented by Prof. K. Kasturinangam, Chairman, ISRO, on 4th July 1997.

Shows

Name of the regular shows: 'Journey to Antarctic', 'Rashis and Nakshatras', 'Night sky of Kolkata', etc.

Name of the Special shows: 'Transit of Venus', 'Close encounters with Mars', 'Journey to Saturn', 'Pluto Dethroned' etc.

The Planetarium organized seven shows in every day in three different languages. The show timing are as follows :

Hindi	Bengali	English
12.30 P.M.	3.30 P.M.	1.30 P.M.
2.30 P.M.	5.30 P.M.	6.30 P.M.
4.30 P.M.		

Sunday and holidays : Two additional shows at 10.30 a.m. (Hindi) and 11.30 a.m. (Bengali).

Graded school programmes

For School goers:

The Planetarium has been conducting a series of graded school programmes for children of various age groups. The Planetarium conducts workshop for the school children as per their syllabus.

For Colleges and Universities:

In the year 1993 M.P. Birla Planetarium introduced a Post-Graduate Diploma Course in Astronomy and Planetarium Science. In 1999 the Planetarium joined hands with the Birla Institute of Technology and Science, Pilani and introduced a new course called the M.Phil course in Astronomy and Planetarium Science.

Outreach Programmes

The Planetarium has hosting and participating in several National and International seminars in astronomy and connected fields and has been regularly organizing astronomical expeditions for the studies of Solar Eclipses and exhibitions in connection with centenaries of astronomers like Galileo, Kepler, Tycho Buaha and others.

Seminars & Lecturess

seminars and workshop with Astrophysic related topic both National and International. In the national level seminars Scientists from all the institutes and Universities as well as researchers from Kolkata participated.

Starting from 1993 when the M.P. Birla Memorial award ceremony was started seminar continued for 1 to 2 days in every alternate years. The international Planetarium Director Congress General Meeting, held once in every 4 years at the Planetarium and Scientists, Astrophysicists of the Planetarium from all over the world would attend the meeting. Once the first woman visit the Space Valentina Terescova visited the Planetarium and gave demonstration, lecturer to remember the public and attendant scientists. Starting from 2001, in collaboration with the French embassy "Alliance Francaise" the planetarium has organised a series of seminars under the title French Science today. Scientists attached with the Planetarium regularly graded lectures in schools, colleges, universities. Science festivals both in rural and urban areas. Night sky observing sessions are regularly organised monthly during winter where the general public are shown planets, prominent nebulae, the features on moon etc. Faculty members of the institute also taken part in teaching.

Publication

The Planetarium has been regularly publishing a scientific journal called "The Journal

of M.P. Birla Planetarium" wherein appear contributed articles from astronomers from India as well as from abroad. Journal published in quarterly. An editorial board has been suitably set up for the assessment and sensibility of the articles received for publication. In recent years, the planetarium has also brought out some astronomical publications like "Bust Stories", "A Brief Introduction of Astronomy", yearly astronomical pocket-calendars and picture post-cards etc. Recently it has prepared a VCD titled "Cosmic Images" containing some of the most stunning pictures of celestial objects obtained in the last decade. Some important of the journals of contents of the current issues volume 4, number 4 are stated

- (1) *Dark Matter in Clusters of Galaxies*
Prof. Richard Tailet
University of Savoie, France
- (2) *The Physics of Rings*
Srikanth Sugavanam
M.P. Birla Planetarium
- (3) *Study of the Planets by Space Probes*
B. Basu and Silpi Sarkar
M.P. Birla Planetarium
- (4) *Vagabonds of the Solar System The Interplanetary Bodies*
Dr. Debiprosad Duari
M.P. Birla Planetarium

Library

Science thrives and flourishes one communication and exchange of information. Library can satisfy the needs of an individual. With this in mind Planetarium has embarked on a project for libraries to facilitated access to satisfy information requirements. The library of M.P. Birla Planetarium is very much rich with books.

Courses

M.P. Birla Planetarium has introduced three different courses i.e. evening course, P.G. Diploma and M. Phil. The evening course has been introduced in 1964 and the class structure is for 80 students. In 1993 P.G. Diploma has been introduced and the number of students for this course is 20. In 1998 M. Phil course has been introduced by M.P. Birla Planetarium only for 5 students.

Astronomy is a visual science, in the sense that few scientific disciplines produce more fascinating images than those of planets, stars, nebulae and galaxies. The tremendous popularity of astronomy among children and adults everywhere stems largely from this visual appeal.

Reference***Books:***

Ronan A Colin, The Practical Astronomer, First published in 1981, Roxby Press Ltd., 98, Clapham Common Nauthside, London SW4959, Published in this edition

Friedman J. Alam, Loweeny F. Lawrance, Pulos Steven, Schatz Dennis, Sheider I-Cainy and Illustrated Y Went Z Budd, Planetarium Educator's Workshop Guide, first published in 1980, Published by the International Planetarium Society.

Sen S.N. and Bose D.M., History of Science in India Published in 1972, Published from national Science Academy, New Delhi.

Newspapers.

The Telegraph (Wednesday 28th June, 2006).

Hindusthan Times (Monday, October 30, 2006).

A write up on M.P. Birla Planetarium, Kolkata by Dr. Debi Prasad Duari (Director, Research and academy).

Websites

<http://education.vsnl.com/planetarium>.

<http://www.ips-planetarium.org>

Museum of Man – A unique representation of cohesive lifestyle of various Indian communities

BIPASA ROY CHOWDHURY (MAHAPATRA)

Museums have the responsibility to portray our valuable culture and heritages where they are maintained for the present and preserved for the future. Museums are the places where objects are collected, displayed and preserved. Museums preserve the cultural heritage of Indian communities and play an important role to save the diverse cultural heritage of our country. Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS) is basically an ethnographic museum. [Ethnography: Ethnography is the first hand account of the social life and culture of a particular human community or society.]

Historical background

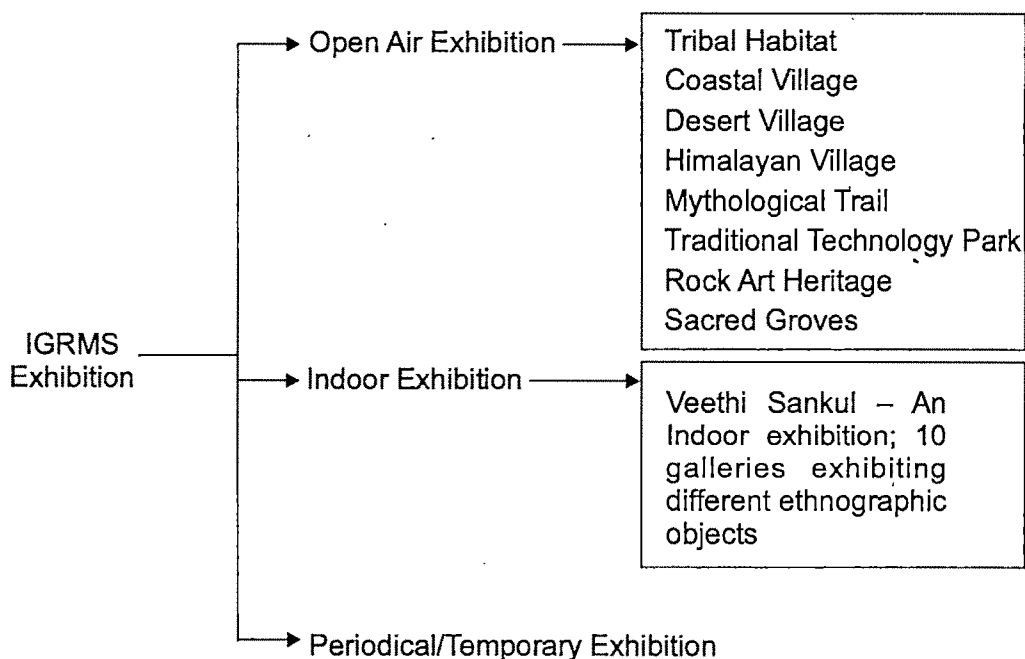
In 1972, the then President of the Anthropology and Archaeology section, Sri Sachin Roy in his book "Museum of Man in India: problems and prospects" emphasized the need of a 'Museum of Man' in our country and he appealed to the then Prime Minister of India to consider and setting up of a museum of man. After many discussions in the year 1976 held in department of culture a committee was set up with Dr. S C Dube (the then director of Indian Institute of Advance Study in Shimla) as its Chairman and Kumar Suresh Singh (formerly Director General, Anthropological Survey of India) as a member of secretary, other members were distinguished sculptor and authority of Tribal art Prof. Sankho Chaudhary. They play a vital role in giving shape to the idea of National Museum. The main idea behind the establishment of the 'Museum of Man' would be to present an incorporated vision of human life. IGRMS begin on 21st March, 1977, at Bhalwalpur house, New Delhi. State Govt., Madhya Pradesh offered 200 acres of land in the outskirts of Bhopal Lake. On 21st April, 1979 the foundation stone of the museum was laid by the then Union Minister Dr. P C Chunder. In the year 1985, the organization named 'Rashtriya Manav Sangrahalaya' in Hindi and 'National Museum of Mankind' in English. In the year 1993, the name of late Prime Minister Indira Gandhi was prefixed considering her influential contribution and in development of the museum. Geographically 'Shamla hills' is a very important site because the crest of the hill presents a number of rock cave shelters with prehistoric rock painting.

Museum is a treasure house of knowledge - protecting, preserving and displaying for everyone who want to acquire. IGRMS is an ethnographic museum. It's main aim is to depict the story of humankind in time and space. IGRMS collects

various cultural, traditional and contemporary objects related to folk and tribal people of India. IGRMS has introduced a new museum movement in our country to protect the material and intangible culture of the Indian communities. It is a research centre of the communities to stimulate the process of planning and development.

Different Indian communities represent diversified cultural group of people. IGRMS has been created in the backdrop of the fast changing cultural landscape of India. The main aim of IGRMS is to protect those disappearing communities from exploitation. IGRMS seek to preserve protect and present the valuable elements of living culture. The museum has been trying to highlight the elements of cohesive life ways in rural areas through various pilot projects which has been vanishing rapidly by the industrialization, technification etc.

The primary objective of IGRMS is to portray cultural diversity in India. The unique thing about this museum is that it has initiated new and many more meaningful ways of 'representing' the creativity and cultural expression of tribals and their village societies.



Tribal Habitat

These exhibition (open air) developed on the south eastern hill top of the IGRMS campus and it spread over in about forty acres of land. Tribal habitat attracts a

large number of visitors to the museum. Tribal habitat represents the unique ethno architectural pattern and life ways, of different tribal communities from all over the country. The remarkable feature of this exhibition is that the exhibition represents life size dwelling complexes. Those structures built by the different tribal communities of India and by using typical indigenous raw materials available in their local vicinity. For this purpose the raw materials transported from the respective regions to Bhopal to rebuild the replica. Tribal artisans were invited to the museum campus to rebuild their dwelling complexes and create a real ambiance within and outside of their dwelling. From time to time they would visit museum campus to supervise the arrangements in each of their house types. The museum staff would also visit those tribal areas to document their fairs and festivals and art and craft traditions to display these elements in the house types⁸. These dwelling represents Warli of Maharashtra, Toda of Tamilnadu, Gadaba, Saora and Kutia kondhs of Orissa , Rathwa and Cahaudhary of Gujrat, Santhal of Jharkhand, Agaria and Bhil of Madhya Pradesh, Tharu of Uttarakhand, Bodo Kachari, Mishing Karbi of Assam, Chakhesang Nagaland, Kamar and Rajwar people of Chattisgarh, Galo of Arunachal Pradesh, Lepcha of Sikkim, Reang of Tripura, Jatapu of Andhra Pradesh, Bhumij of West Bengal, village gates of Ao Naga and Chakesang Naga of Nagaland and the shrine of Maoli Mata of Bastar, Chattishgarh. This open air exhibition also has the life size exhibits of the dormitories of a number of tribal groups i.e. , Muria of Chattisgarh , Zemi Naga of Assam, Konyak Naga and Ao Naga of Nagaland and Mizo of Mizoram. The Indoor introductory gallery at the base of the exhibition provides first hand information on culture of the tribes depicted in this open air exhibition.

Coastal village

This open air exhibition represents dwellings and related cultural identities built up in about twenty acres of land. These typical traditional houses represent the life styles and cultural traditions of different Indian coastal communities. The exhibits are wooden racing boat also known as snake boat (Polliyodam)[this particular boat is 110 ft. in length], typical wooden house of Kerala known as 'Arapura' means wooden cottage, Naalkettu from Kerala, Shrine of Aiyyanar from Tamilnadu etc.

Desert village

Desert village represents dwelling types from Rajasthan and Gujarat. These dwelling types depict their adaptation with environment. In desert village we can see traditional Bhunga of the 'Rabari' people, dwelling complex of Rajputs, traditional stone house from Jaisalmer and a huge sized stone chhatri are also displayed in this open air exhibition which are important examples of stone architecture.

Himalayan village

Himalayan village is one of the unique display in the open air exhibition. Here in display we can see the typical stone building (the dwelling complex) popularly

known as Kothi from Shimla, Himachal Pradesh. The entrance gate of IGRMS known as Parol or Paraud has been constructed as a reminder of the culture of the Himalayan region. Another house type known as choukat from Uttarakhand is also displayed here which is well known for earthquake resistant variety.

Mythological trail

This is one of the special sections of IGRMS exhibition. This exhibition depicts myths and stories of different folk and tribal communities of India which have been crafted in different media like terracotta, wood, stone, iron etc. The main attraction of this exhibition is crafts of various artisan groups and traditional paintings.

Rock Art Heritage

It is an open air exhibition containing pre-historic painting in the 36 rock shelters spread out in the museum campus in four locations. IGRMS is one of the few museums in the world which has prehistoric rock paintings in the museum premises. This exhibition opened in the year 1991.

Traditional Technology Park

This open air exhibition was opened to the public in year 2008 during the 32nd foundation day of IGRMS. This is an unique exhibition which presents the sustainable technology and the knowledge and wisdom practiced by the indigenous people with the locally available resources.

Sacred groves

It is an exhibition where replicas of sacred groves of Chhattisgarh, West Bengal, Tamilnadu, Maharashtra, Rajasthan, Meghalaya, and Manipur have been ritually established by ceremonies by local communities.

Indoor exhibition (Veethi Sankul)

Veethi sankul the indoor exhibition was opened to the public in the year 2005. These sections depict the story of human in 10 galleries. These galleries represent the rich and diversified tribal and rural culture of India.

Gallery 1 : Human and Bio-cultural Evolution – this gallery represents the process of human evolution. Different stages have been shown through charts, sketches, photographs, models etc.

Gallery 2 : Human Odyssey – This section depicts material cultural settlement pattern of Hunter and gatherers, shifting cultivators, pastoralists, nomadic community.

Gallery 3 : Lingo Jatra – It depicts a festival of Koiror community of Bastar district of central India.

Gallery 4 : Mandwa Gohri – This gallery presents ritual exhibits, life ways, and agricultural instruments of Bhil tribes of Western India.

Gallery 5 : Ethnic Art – this section presents ethnic art of folk and tribal communities of Rajasthan, Madhya Pradesh and Andhra Pradesh.

Gallery 6 : Belief system, Cosmology and Ritual art - this gallery presents ritual objects, photographs, paintings etc. to describe the rituals and belief systems of different communities.

Gallery 7 : Ethnic music and performing traditions - here we can see the music traditions of various Indian communities like a collection of Indian drums from folk culture, plucking instruments of Indian folk music, traditions of puppetry etc.

Gallery 8 : Masks – this gallery displayed varieties of traditional masks from different parts of India.

Gallery 9 : Folk cultures and culinary traditions - in display we can see culinary traditions, traditional architecture, textile tradition etc.

Gallery 10 : Reserve collection and research gallery - IGRMS is one of the few museums where specimens from reserve collections are on display in a big hall on the lower ground floor of the indoor museum. This is also known as Visual Storage.

Periodical/Temporary Exhibition

Periodical or Temporary exhibitions are on various themes from time to time.

Manav Sangrahalaya depicts life and ways in Indian societies. The interesting aspect of the museum is that the museum involves community group's participation in design and display from different parts of India to make the exhibition alive. IGRMS is a living museum because it preserves bio-cultural diversity, indigenous knowledge system and skills.

References

Basa, K.K., Jayaprakashan G. (ed), 2010, *Indira Gandhi Rashtriya Manav Sangrahalaya (National Museum of Man/Ind) A museum with difference. Multiple Heritage: Role of specialized Museums in India*, IGRMS, Bhopal.

Singh K S., Souvenir 22nd March 2005, Making of Indira Gandhi Rashtriya Manav Sangrahalaya: Some Reminiscences.

Negi R S., Souvenir 22nd March 2005, Foundation stone.

Chakravarty K K., Souvenir 22nd March 2005, Indira Gandhi Rashtriya Manav Sangrahalaya: The Noah's Ark.

Web References: www.igrms.com

Call for a standard documentation system in the museums of West Bengal with special reference to Indian Museum, Kolkata

SHILPI ROY

Introduction

West Bengal holds a certain pre-eminence as a museum centre, not only because the Indian Museum, Kolkata is largest and oldest institution of its kind in the Asia Pacific region but also because of the variety of types of museum represented here. The wealthy collection of museums of West Bengal should be documented following a standard documentation system.

Ambrose and Paine (1993, P: 150) denote.

“There is nowadays a standard documentation system increasingly agreed by museum workers throughout the world”. It has six parts :

- (1) Entry documentation
- (2) Accessioning
- (3) Cataloguing
- (4) Indexing and retrieval
- (5) Movement control
- (6) Exit documentation

A procedural manual is an evolving series of clear instructions available to the staff to standardize the recording of information about the collection of a museum. A number of national and international agencies have suggested standard and guidelines for improving documentation system, such as International Documentation Committee of the International Council of Museums (ICOM-CIDOC), Museum Documentation Association (MDA), Art Information Task Force (AITF) and Canadian Heritage Information Network (CHIN), etc. Museums of West Bengal should follow proper strategies and policies to develop an up-to-date procedural manual, taking into account the recognized guidelines, level of urgency of standardization including digitization, existing circumstances, available means and future projections.

Features of Documentation System in Indian Museum, Kolkata

Founded in 1814, the Indian Museum, Kolkata is a repository of many rare and unique Indian and trans-Indian specimens relating to social, natural sciences as well as humanities and it is included as an Institution of National Importance in the

seventh schedule of the constitution of India. At present, it has six sections, namely Art, Archaeology, Anthropology, Geology, Zoology and Economic Botany of which the first three sections are under the control of the Museum directorate under the Board of Trustees, the affairs of the last three sections are controlled by respective surveys of Government of India.

Documentation system of the Indian Museum, Kolkata is centralized, with departmental variation. Both manual and computerized documentation is maintained here. Some of the features of documentation system of this museum are described below:

- (1) An object is accessioned in a systematic manner, by assigning a unique identifying number, marking the number on that object, recording information about that object in General Accession Register. In Accession Register, object's information is recorded under columns namely Serial No., Date of Entry, Accession Number, Mode of acquisition, Description, Material, Weight and Measurement, Period, Locality, Price, Location in the museum, Remarks and Reference, and Initial of custodian/ Supervising Officer/Director.
- (2) A Photography Unit was set up in the Indian Museum in 1964 for photo documentation. Before accessioning, the required photographs of the object are taken in photography section of the museum. Different views of the object may be photographed, such as front view, back view, side view, broken part, etc, where required. In Photography Unit negative register is maintained, which includes detail regarding the photo-documentation work of each section.
- (3) Complex Bipartite numbering system is applied for numbering object. In this system coded letter(s) preceding the numbers is used to designate particular section under which the object is accessioned and numbers are composed of two parts; the first part indicates year of acquisition and second part indicates serial number of the object in each section. For example (1) A2002 / 2 that indicates the object is 2nd Collection of the year 2002 in Archaeology section. (2) At / 90 / 1510 in which At indicates Art section, 90 indicates Year of Acquisition and 1510 indicates Serial Number of the object in the year of acquisition. (3) Anth 90 / 33 indicates the object is 33rd collection of the year 1990 in Anthropological Section. Only temporary number is given to the loan object, using simple numbering system, such as 1, 2, 3, 4 etc. in all the sections.
- (4) Marking is done by the marksman in such a manner that the number is to be easy to locate without disfiguring any aspect of the object, preferably in the back side of the accessioned object. Ivory, terracotta objects are marked using synthetic colour; textiles are marked with Chinese ink.
- (5) Cataloguing, the systematic classification of the accessioned object is done in each section. The common bases of classification of the collection in Archaeology Section are Material, Period, School, Site, Dynasty (Coin). In Art section, Medium of the object is a primary category of classification,

such as terracotta, wood carving, textile, metal, leather, stone, etc. The objects are also divided into groups on the basis of their classes (e.g., Painting and drawing) and then subdivided into smaller units according to province or period or school (e.g., Mughal, Rajput, Pahari and so on.) In Anthropology section, classification of cataloguing is based on different primary necessities as well as different cultural aspects of the tribal people, such as, House type, Basketry, Dress and headgear, Pottery, Ornaments, Religious articles, Domestic implements, Educational articles, Fishing implements, Narcotics, Agricultural implements, Dolls and Toys, Arms and Weapons, Miscellaneous, etc.

The image shows two views of a catalogue card. The left view is the front, titled 'INDIAN MUSEUM Anthropology Section'. It contains fields for: Accession No., Name—English, Classification—Major-group, Collector, Field Regt. No., Name of Collection, Locality, Series of Collection—Breed, Sex, Community of origin, Production method, Use—Sex, Primary use, Secondary use, Location, Date Recd., and Discovery Spot No. The right view is the back, titled 'Description', and contains fields for: Release of published work, if any, Register No., and a box for Photograph or Sketch.

Fig 1: Front and Back View of Catalogue Card of Anthropology Section, Indian Museum, Kolkata

- (6) Indexing: In each section Index cards are prepared according to the order of classification followed by that section.

The image shows the front view of an index card titled 'INDIAN MUSEUM, KOLKATA INDEX CARD'. It has a table structure with the following fields:

INDIAN MUSEUM, KOLKATA INDEX CARD					Section
Acc. No.	Cat. No.	Size/Vol.	Material	Period	
Provenience	Location	Condition	Remarks		
DESCRIPTION					

Fig 2: Front View of Index Card of Archaeology Section, Indian Museum, Kolkata

- (7) In Movement Register every change of location of the object is recorded under columns, namely Date, Serial No., Reg/Acc No., Short Description, Location (From-To), Purpose of removal, Name and Signature of the Officer and Remarks.
- (8) When any object is sent outside as a long term loan, mention is made on its respective catalogue, recording the date of movement, by whom and where to. It is necessary to record information on a loan card in case of inter-state or international or inter-museum exhibition. A Report is prepared by the section concerned, besides all the details are incorporated with Valuation and insurance coverage, Photograph of the object, and Conservation report.
- (9) The preservation Unit keeps record of museum object, which gets treatment in the conservation Laboratory. A Treatment Record of Metal objects/Coins, etc. includes information under columns, namely Sl. No., Date received, Owner, Acc. No., Brief Description, Provenance, Period, Shape and Size (details if necessary), Brief History, Name of Metal, Physical condition, Nature of corrosion (present/absent, colour, thickness, extent of core, composition, Extraneous incrustations:), Photographic record (Negative No, light source, Number of prints with reports), Treatment, Remarks by the Head of the Team, Date of completion, and Date of Return.
- (10) The Computer Unit of the Indian Museum, Kolkata took up the work of computerized documentation system of artefacts in 1993. Cyber Animatrix Pvt. Ltd. (CAPL) has done major computerization of the Indian Museum, Kolkata, starting with its web site www.indianmuseumkolkata.org which inaugurated on 22.07.1999. Museum has adopted "Antiquity" pioneering software in India on Digital Documentation and Conservation Process of Museum objects produced by CAPL. The Museum has decided a perspective plan to complete the digitization work of the entire museum collection in 2004.
- (11) Previously, every 10 years to 15 years gap detail physical verification of the entire museum collection were carried out by constituting a Physical Verification Committee. Now, yearly physical verification of the museum collection is an essential part of museum functioning. The members of the Physical Verification Committee are eminent experts of art and culture.
- (12) Proper and regular maintenance of the Accession Registers is considered essential for the safety and security of the museum objects. A duplicate set of records is maintained in a separate location in the museum to avoid potential threats of fire, flood and theft. Movement of registers is restricted. Accession register, index cards, catalogues and other documents are kept in steel cabinet and Naphthalene balls, silica gel, etc. are used to protect the

documents against any microbial deterioration. All the registers, cards, forms, etc. are handled properly and safely to avoid any kind of deterioration.

Problems in the existing Documentation System in Indian Museum, Kolkata:

The documentation system of this Museum is systematic, but the museum has faced problems due to absence of any standard procedural manual to guide the documentation activities of the staff involved. The lacunae of the existing documentation system are:

- (1) This Museum does not follow any standard produced by recognized Documentation agencies of the museum world. There are areas such as, acquisition information, terminology control; object's condition documentation, insurance and evaluation report, etc., where museum requires proper consultations with the related guidelines. The decisions taken by the Museum in the above activities often lacked objectivity, uniformity and transparency. This is more promptly revealed in the 'Buddha Head' (Sarnath, 5th century AD) theft incident in December, 2004. The area where the theft occurred has not covered by CCTV and the value of the stolen antiquity has not been assessed in the existing documentation system of the museum.
- (2) According to an Audit Report (2005, MOC; P: 35), The Indian Museum, Kolkata has not maintained any Centralized Accession Register with the details and locations of all objects possessed by the Museum. The Report further adds that entries in the Accession Registers are not complete. Details of period and location of the objects and their conditions are not properly recorded. It becomes difficult to disclose the total number of objects possessed by the Museum due to absence of running numbers in the accession registers allotted to the objects.
- (3) Again, the Audit Report (2005, MOC; P: 36) reveals that the Museum has attributed the discrepancy in the figures to a large number of transfers of objects between the Museum and the different Surveys, namely Botanical, Zoological, Geological and Anthropological. No record is, however, maintained of such transfers, in the absence of which the authenticity of the figures or the physical existence of the unaccessioned objects has not been established.
- (4) Due to lack of permanent technical staff in the various sections some times, extra pressure creates on existing staff, which affect the curatorial work including documentation.

Conclusion

The Indian Museum, Kolkata holds a legendary position in the cultural sphere of West Bengal and it should evolve a procedural manual based on globally accepted documentation standards and norms in conformity with its defined missions and

objectives, functional areas and resource positions to bring about uniformity and transparency in its operations. It should further urgently formulate a time bound action plan for implementation of this system in present context. As a pioneering institution of the museum movement of West Bengal, the Indian Museum, Kolkata should take initiatives for standardizing documentation system practised in the museums of West Bengal by arranging seminars, workshops, sharing technical expertise and so on.

Reference

- Ambrose, T and Paine, C (Eds.). (1993). *Museum basics*. (3rd ed.). London: Routledge.
- Annual Report. 2010-2011. Ministry of Culture. Government of India.
- Audit Report (civil). 2005. No:4. Ministry of Culture. Government of India.
- Choudhury, A.R (1963). *Art Museum documentation and practical handling*. Hyderabad: Choudhury and Choudhury.
- Dudley, D. H. and Bezold W.I. (1968) *Museum registration methods*. Washington: American Association of Museums and the Smithsonian Institution.
- Light, R; Roberts, A; Stewart, J (Eds.) (1986). *Museum documentation system: Development and applications*. London: Butterworths
- www.capl.in accessed on 15.06.2013, 17.06.2013
- www.indianmuseumkolkata.org accessed on 17.06.2013, 21.06.2013.

Plants in the service of man: a brief survey of the Indian Museum, Kolkata

MOUSUMI PURKAIT

Introduction

In the gallery of Industrial Section of the Indian Museum, Kolkata are represented specimens of commercial and industrial interest from all parts of India, chiefly belonging to the vegetable kingdom. The formation of the Bengal Economic Museum was happened in Calcutta in 1872. Suggested by Sir George Campbell, Justice Phear instituted the a large collection of the commercial and industrial products of Bengal and making it accessible to the public. The collection was to include seeds, grains, fibres, silk, oils, drugs, timbers and minerals.

The economic botany collections in an important research resource because of its extraordinary breadth and the copious documentation associated with many specimens. Economic botanists explore the interface between people and plants to describe the cultural used of plants.

The gallery

The gallery of the Indian Museum, Kolkata is arranged in seven bays: (1) Timber Section, (2) Medicinal Products Section, (3) Food Products Section, (4) Vegetable Fibres Section, (5) Dyes and tans Section, (6) Oil and Seeds Section (7) Gums and resins Section.

In the centre of the gallery are displayed the finished commercial goods produced by Indian factories. This section contains some selected timbers for mainly economic use. The wall cases are constructed under three divisions – the larger glass, sloping cases and glass faced index boxes. The object of this gallery has been to give in a bird's eye view an illustration of the trade and commerce of the country. In this timber section, there are various articles made of wood such as caskets, grain measuring cups, powder boxes, spoons, sandal wood pencil, combs and different types of toys.

Specimens of medicinal products are on display in four bays. The collections include a large variety of crude drugs obtained from roots, leaves, barks, flowers, fruits and seeds. The food products section is arranged with a comprehensive collection of plant materials, which are valuable as food products for human consumption, as fodder for cattle and other domestic animals, and such other materials, which are used in various ways. Different types of crop plants are exhibited in this gallery. Flow chart showing the utilization of rice is also a very useful and

informative addition to the series of exhibits in the food products section. Vegetables also receive a place in this section and they are shown by either specimens or suitable models. Fibres used in the manufacture of brushes, carpets with some of their finished products are shown here. The dyes section contains a valuable collection of samples of oil, oil seeds, as well as well as oil cakes. The farthest end of the main gallery is devoted to gums and resins section. The gallery provides the field cultivated economical plants commonly used in India as well as its commercial perspectives.

The industrial section is also arranging visual education through organizing exhibitions, mobile demonstrations etc., on the role of plants in environmental protection, their importance in over daily life and the need for their conservation.

Notable collections

Thousand of collections are exhibited in this section; some important and common plants are mentioned here.

Shorea robusta Gaertn (Shal), *Tectona grandis* (Segoun), *Dalbergia Sisso* (Sisso), *Albizia lebbek* (L) Benth (Siris), *Swietenia mahagoni* L. (Mahogany), *Santalum album* L. (Swet Chandan). *Zingiber officinal* Rose (Ada), *Curcuma longa* (Haldi), *Hibiscus rosasinensis* (Jaba), *Ocimum sanctum* Linn (Tulsi), *Centella asiatica* (Thankuni), *Adhatoda vasica* Nees (Basak), *Azadirachta indica* (Neem), *Oryza sativa* L. (Dhan), *Zea mays* L. (Bhutta), *Triticum aestivum* L. (gam), *Cajanus cajan* (L) Mill (Arhar), *Daucus carota* Linn (Gajar), *Solanum tuberosum* Linn (Alu), *Gossypium herbaceum* L. (Karpas), *Corchorus capsularies* L. (Pat), *Helianthus annuus* Linn (Surja mukhi), *Lawsonia inermis* L. (Mehendi), *Terminalia chebula* (Haritaki), *Ricinus communis* (Rehri), *Arachis hypogea* L. (China Badam), *Brassica campestris* (sarisha tel), *Cocos nucifera* L. (Narikel), *Albizia amara* Baiv (Krishna siris), *Aegle marmelos* (L) Corr. (Bel).

Plants and people

The various types of plant products are very essential to mankind. From the very beginning of the human race, man is dependent on plants for the essentials of his existence. Three major necessities of human life i.e. food, clothing and shelter are obtained mainly from plants. Although man is partly dependent on the flesh of herbivorous animals regarding protein food but such animals are equally dependent on plants like man as they are not able to manufacture their own food from raw materials.

The other two prime necessities of life i.e. clothing and shelter are also devised largely from plant fibres and from plant wood respectively. Wood obtained from plants is used as structural material besides wood is used as fuel and contributes in the manufacture of rayon paper, various chemicals etc. Fibres obtained from different plant parts are used in the manufacture of fabrics for clothing. Drug used to cure disease are mainly plant products. The various types of raw materials used

for industrial purpose are obtained from plants – tanning, materials, cork, dyestuffs, oils, resins gums, rubber etc. are a few examples of such raw materials.

Besides the above mentioned uses of plants as sources of food, clothing drugs and raw materials for industry, plants also play an important role in other ways, i.e. it plays an important role in controlling the environment, for example, the effects of forests and other types of natural vegetation in controlling rain fall, erosion and maintenance of ecological balance.

The natural products initiative aims to revitalize the tradition of economic botany at the Field Museum and to highlight the essential contribution of the plant world to our everyday lives. Studies of the evolution of cultivated plants include the process of domestication and the relationship between natural and human selection of specific plant traits. Knowledge of botany is essential to understanding how domestication may have changed a plant species over time. On the other hand, the impact of human activity on the landscape and biological diversity are also of increasing concern to ethnobotanists. The effect of human presence can be seen in every ecosystem they inhabit.

The relationship between people and plants has always been profoundly important. Cultural diversity is inherently linked to biological diversity and that effective stewardship of Earth, must involve local people.

Conclusion

In Economic Botany Section of the Indian Museum, Kolkata many dry specimens are exhibited a living plant i.e. a potted plant may give the actual nature of plant. However, it is not possible for a museum to maintain a huge number of potted plants. So Economic botany Section of Indian Museum should arrange some educational programme to enrich the public awareness about the importance of plants in human life. Through this section, the Museum tries to aware of the importance of plants and their products in daily life.

Reference

- Ambrose, Timothy and Paine, Crispin 1993. Museum Basics. ICOM and Routledge, London and Paris.
- Berg, R. Linda. 1977. Introductory Botany, plants, people and the environment. Sanders College Publishing, Harcourt Brace College, Publishers.
- Chandrasekhar, M.S. 1970. Botany in Indian Museums. Published by Shri V.H. Bedekar. Department of Museology, M.S. University of Baroda.
- Greenhill – Hooper Eileen, 1999. The educational role of the Museum. Routledge, London.
- Pandey, S.N. and Chadha, A. 1994. A Textbook of Botany, Vikas Publishing House Pvt. Ltd., New Delhi.

লিপি : রবীন্দ্রনাথের পাণ্ডুলিপি সংরক্ষণ পরিকল্পনা ফসল

প্রদীপ কুমার মন্ডল

লিপি হলো কবিগুরুর মহান আদর্শে অনুপ্রাণিত হয়ে বিশ্বভারতীর এক অত্যাধুনিক উদ্যোগ। প্রকৃতপক্ষে কোন একটি বিশেষ ভাষার পুঁথি বিভাগীয় পুঁথিশালা বা Manuscriptorium -এ থাকই ছিল বিশ্বভারতী বিশ্ববিদ্যালয়ের রীতি অর্থাৎ বাংলা বিভাগের পুঁথি বাংলা বিভাগের পুঁথিশালাতে থাকবে। এর ফলে ঐ বিভাগের ছাত্র, শিক্ষক, গবেষক সকলের ক্ষেত্রে তথ্য সংগ্রহ করা সহজসাধ্য হবে। এই পদ্ধতি সংস্কৃত, ওড়িয়া, তামিল, হিন্দী, ইন্দো-তিব্বতীয়, পার্শী, চীনা সমস্ত ভাষা বিভাগগুলির ক্ষেত্রে প্রযোজ্য ছিল। সেক্ষেত্রে অসুবিধা ছিল প্রত্যেকটি ভাষা বিভাগে পুঁথির মতো অনুভূতিপ্রবন জিনিষের রাখার জন্য উপযুক্ত পরিকাঠামোর ব্যবস্থা করা এবং সঠিক প্রশিক্ষণপ্রাপ্ত কর্মীর ব্যবস্থা করা বাস্তবিকভাবে অসম্ভব। এর ফলে পুঁথিগুলির ক্ষেত্রে সঠিক নথিভুক্তিকরণ (Documentation), সংরক্ষণ (Preservation), প্রতিরোধী সংরক্ষণসহ রক্ষণাবেক্ষণ (house keeping with preventive measure) এবং দর্শকদের প্রয়োজনীয়তা পূরণ (User service) ইত্যাদি যথোপযুক্ত সময়ে সম্ভব হচ্ছিল না। কোন বিভাগীয় শিক্ষকের অধীনে চতুর্থ শ্রেণীর কর্মীর দ্বারা নিয়ন্ত্রিত হতো। এই সমস্যা সমাধানের জন্য বিশ্ববিদ্যালয়ের প্রশাসন ঠিক করলেন একই ছাদের নীচে সমস্ত ভাষার বিভাগীয় পুঁথিগুলি রাখার উপযুক্ত ব্যবস্থা করা হবে। এর ফলশ্রুতি হিসাবে Lipika Manuscriptorium বা লিপি পুঁথিশালার উদ্বোধন হলো ২০০৮-এর ডিসেম্বরে। এর ফলে সহজে ও কম খরচে সমস্ত পুঁথির সংরক্ষণে বিশেষ সুবিধা হচ্ছে। User service-3 অনেক সহজে সম্ভব হচ্ছে।

রবীন্দ্রনাথ, প্রাচীন পুঁথি ও সংরক্ষণ

আমরা সকলেই জানি রবীন্দ্রনাথ ঠাকুর নিজের সৃষ্টি সম্বন্ধে খুব একটা সংরক্ষণশীল বা যত্নশীল ছিলেন না। সামান্য অনুরোধ বা নিজের আবেগে নিজের সমস্ত অসামান্য সৃষ্টি তিনি অক্রেপে দান করে দিতেন। রবীন্দ্রনাথ ঠাকুরের এই স্বভাবের জন্যই তাঁর সৃষ্ট বহু অসামান্য সৃষ্টি পৃথিবীব্যাপী বিভিন্ন আত্মীয়-স্বজন ও বন্ধু বান্ধবের মধ্যে ছড়িয়ে ছিল। ১৯৪১ সালে রবীন্দ্রনাথ ঠাকুরের মৃত্যুর পর তাঁর স্মৃতিতে ভারতে প্রথম Biographical Museum এবং দ্বিতীয় University Museum (১৯৩৭ সালে কলিকাতা বিশ্ববিদ্যালয়ের আশুতোষ মিউজিয়ামের পর) প্রতিষ্ঠার সময় জ্যেষ্ঠপুত্র রথীন্দ্রনাথ ঠাকুরের বিশ্বভারতী পত্রিকা-এ বিজ্ঞপ্তি দিয়ে অনুরোধ জানাতে হয় নোবেল বিজয়ী কবির কোন স্মারক কারোও কাছে থাকলে তিনি যেন অবিলম্বে রবীন্দ্রসদনে দান করেন। ১৯৪১-এর ডিসেম্বর মাসে বিশ্বভারতী নিউজে রথীন্দ্রনাথ ঠাকুর যে বিজ্ঞপ্তি দিয়েছিলেন তা হলো :

I greatly acknowledge receipt of many books, magazines and journals dealing with my father's life and works. I appreciate them not only as tokens of homage and reverence to his memory but also as valuable material for future study and reference for scholars and research workers. For this very purpose we are contemplating to set up at Santiniketan a Rabindra Museum which will contain, amongst other things, my own collection of photographs, manuscripts, newspaper

cuttings, books, magazines etc. An entire section of the museum will be devoted to writings on him and this will be devoted to writings on him and this will be arranged in accordance with their subject matter. As I would very much like to retain all the special memorial issues together and at the same time arrange their content subjectwise, I shall deeply appreciate if two copies of each book, magazine and journal are sent specifically for the purpose of the museum. I invite everybody's help and co-operation to enable us to make the museum an institution itself. Any other material, which may add to the value of the collection, photographs, manuscripts, letters etc, will be most welcome and gratefully acknowledged.

কিন্তু রবীন্দ্রনাথ ঠাকুরের সংরক্ষণ চেতনা ছিল না এরকম ভাবে ভুল ভাবা হবে। বরং এই ব্যাপারে তিনি ছিলেন অত্যন্ত সংবেদনশীল ও সতর্ক। তিনি অনুধাবন করেছিলেন আমাদের দেশের ঋতুবৈচিত্র্যের জন্য, তাপমাত্রা ও জলীয় বাষ্পের তারতম্যজনিত কারণে এবং কীটপতঙ্গ ও ছত্রাকের আক্রমণে বহু মূল্যবান পুঁথি সবার অগোচরে নষ্ট হয়ে যাচ্ছে। তাঁর কাছে প্রতিটি পুঁথিই ছিল অত্যন্ত গুরুত্বপূর্ণ। তাই পুঁথিগুলি সংরক্ষণ ও সম্পাদনার দ্বারা সাধারণ মানুষের মধ্যে পৌঁছে দেওয়ার ব্যাপারে খুবই আগ্রহী ছিলেন। কোন প্রাচীন পুঁথির সম্বন্ধে পেলেন তার সংরক্ষণের জন্য তিনি ব্যাকুল হতেন। তিনি গরাণহাটা, বটতলা ও মেছুয়া বাজার থেকে বহু মুসলমানী পুঁথি সংগ্রহ করেন, অষ্টাদশ ও উনবিংশ শতাব্দীর মুসলমান লেখকদের রচিত ধর্মকথা, প্রেমকথা ও পীরগাঁথা পুঁথিগুলির বিষয়বস্তু। তৎকালীন আচার্য অবনীন্দ্রনাথ ঠাকুরের মাধ্যমে এইরকম ৫১টি পুঁথি বিশ্বভারতীতে আসে যা কেন্দ্রীয় গ্রন্থাগারে সংরক্ষিত। উত্তরবঙ্গে জমিদারির কাজকর্ম দেখাশুনার ফাঁকে রবীন্দ্রনাথ ঠাকুর বেশ কিছু পুঁথি সংগ্রহ করেন। 'মেয়েলি ছড়া', 'ব্রতকথা', 'রূপকথা', 'বাউলগান' ইত্যাদি এদের মধ্যে উল্লেখযোগ্য। এখানে আর একটি উল্লেখ করার খুবই প্রয়োজন তা হলো বহুক্ষেত্রে তিনি পুঁথিগুলির প্রতিলিপি করে আসল পুঁথিটি মালিককে ফিরিয়ে দিয়েছেন। রবীন্দ্রনাথ দ্বারা শিলাইদহের কুমার বাউল সম্প্রদায়ের কাছ থেকে সংগৃহীত যোগীর গান (Acc. No. – 1044, 11" × 9", ৯০ বছরের পুরানো) পুঁথিটি তার প্রকৃষ্ট উদাহরণ, এবং লিপিকারে সংরক্ষিত।

এই আদর্শ অনুপ্রাণিত হয়ে বহু মানুষ বিশ্বভারতীর সঙ্গে যুক্ত কিংবা যুক্ত নয় এমন ব্যক্তিবর্গও প্রত্যন্ত গ্রাম থেকে বহু পুঁথি সংগ্রহ করেন, এর ফলে বিশ্বভারতীর বিভিন্ন বিভাগে সংগ্রহ বাড়তে থাকে। যার ক্রমপর্যায়ে অস্তিম পরিণতি হলো বর্তমান লিপিকা। প্রধান প্রধান সংগ্রাহকদের মধ্যে উল্লেখযোগ্য হলেন ডঃ পঞ্চানন মন্ডল, প্রভাত কুমার মুখার্জী, ডঃ অমল পাল ইত্যাদি।

বর্তমান সংগ্রহ ও সমস্যা

ভারতবর্ষের কম বিশ্ববিদ্যালয়েতে বিশ্বভারতীর কেন্দ্রীয় অভিলেখাগারের মতো সংগ্রহ বর্তমান। বিভিন্ন বিভাগ থেকে প্রাপ্ত লিপিকার পুঁথির সংখ্যা ছিল এইরূপ :—

- ▶ বাংলা পুঁথির সংখ্যা — ৮,০০০ -এর মতো
- ▶ উড়িয়া ভাষার পুঁথি — ১১০২
- ▶ সংস্কৃত ভাষার পুঁথি — ৩০০০ -এর থেকেও বেশী

ইন্দো-তিব্বতীয় ও অন্যান্য ভাষা বিভাগের পুঁথিগুলি এখনো লিপিকারে আসেনি।

- ▶ মুকুল নথি প্রায় — ৫,০০০ খণ্ড
- ▶ জয়দেব কৈদুলি নথি প্রায় — ৫,০০০ খণ্ড।

কিছু চিঠি, দক্ষিণ ভারতীয় ভাষায় পুঁথিও বর্তমান।

এই সমস্ত হলো বিষয়ভিত্তিক সংগ্রহ। পুঁথির উপাদানের কথা ধরলে তালপাতার পুঁথি, কাঠের পুঁথি, পাথরের পুঁথির প্রতিলিপি, চিত্রিত পাটা এবং Book Cover ইত্যাদি। এই সমস্ত পুঁথিগুলির বিভিন্ন বিভাগে সঠিক Preventive measure -এর ব্যবস্থা না থাকায় এবং উপযুক্ত পেশাদার লোক না থাকায় বহু পুঁথি বিভিন্নভাবে নষ্ট হয়ে গেছে এবং বহু পুঁথি নষ্ট হওয়ার মুখে। তাদের Condition Report করতে বহু ধরনের সমস্যা দেখা যায় যেমন —

- (ক) বহু পুঁথি অতিরিক্ত জলীয় বাষ্প বা humidity -র জন্য মুড়ে গেছে। এদের অনেক ক্ষেত্রে পাতাগুলি আলাদা করতে পারা যাচ্ছে।
- (খ) বিভিন্ন পোকামাকড় যেমন — termite, silverfish ইত্যাদি পুঁথির অনেক ক্ষেত্রে নষ্ট করে ফেলে।
- (গ) পুঁথিগুলি জীর্ণ লাল কাপড়, Acided paper প্রভৃতি দ্বারা Packing করা।
- (ঘ) Improper lighting গুরুত্বপূর্ণ নথিকে Fade করে দিচ্ছে।
- (ঙ) Ink, paper content, environmental pollutant প্রভৃতি কারণে পুঁথিগুলির অবস্থা জরাজীর্ণ।
- (চ) অনেক পুঁথির কোন documentation নেই, আবার কিছুর সঠিক documentation নেই।
- (ছ) Storing cabinet, Rac এবং Almirah প্রভৃতি মরচে ধরে damage এবং insufficient, যার ফলে বহু পুঁথি অল্প জায়গায় ঠাসাঠসিভাবে রাখা এবং কিছু পুঁথি almirah ও Rac -এর মাথায় রাখা ছিল, যেখানে প্রচুর ধূলো পড়ার সম্ভাবনা থাকে। আর বহু পুঁথি স্থানাভাবে মেঝেতে রাখা থাকে।
- (জ) পুঁথি ও Records গুলো বিভিন্ন আলাদা আলাদা বিভাগে থাকায় কোন uniform documentation বা accessioning system ছিল না। তার উপর বিভিন্ন সময় পুঁথিগুলি short বা arrangement -এর জন্য একই পুঁথির বিভিন্ন জায়গায় বিভিন্ন নম্বর দেওয়া, পুঁথিগুলিকে chronological arrangement করার ক্ষেত্রে খুবই সমস্যা ছিল। তাছাড়া বিভিন্ন বিভাগ থেকে পুঁথিগুলি লিপিকায় নিয়ে আসার ব্যাপারে যুক্ত লোকেরা অভিলেখাগার -এর ব্যাপারে অস্বস্তি হওয়ায়, transport -এর সময়ও বহু পুঁথি নষ্ট হয় এবং পুঁথিগুলি সব মিলে মিশে গিয়ে এক জটিল সমস্যার সৃষ্টি হয়।

বর্তমান পরিস্থিতিতে ও প্রয়োজনীয় পদক্ষেপ

পুঁথি সংরক্ষণের প্রয়োজনীয়তা রবীন্দ্রনাথ ঠাকুর বুঝতেন বলেই বঙ্গীয় ১৩০১ সালে সাহিত্য পরিষদের অন্যতম সদস্য থাকাকালীন পরিষদের পুরানো পুঁথি রক্ষণ-বেক্ষণের জন্য ইশানচন্দ্র বসুকে মাসিক ১০ টাকা বেতনে নিয়োগ করেন। আবার ১৯০৮ সালে তত্ত্বাবোধিনী পত্রিকায় একটি বিজ্ঞাপন দেন যাতে বলেন — “যে সকল মহাশয় আদি ব্রাহ্ম সমাজের পুস্তকালয় হইতে হস্তলিখিত পুঁথি ও পুস্তকাদি পাঠের জন্য ঋণ লইয়া গিয়াছেন তাহাদিগের প্রতি নিবেদন যে তাহারা অনুগ্রহ করিয়া এই মাঘ মাসের মধ্যে সমাজের লাইব্রেরিয়ানদের নিকট প্রতিপ্রেরণ করেন।”

— শ্রী রবীন্দ্রনাথ ঠাকুর, সম্পাদক

শুধু তাই নয়, আদি ব্রাহ্মসমাজের বহু বাংলা ও সংস্কৃত পুঁথি তিনি শান্তিনিকেতনে নিয়ে আসেন, কিন্তু উপযুক্ত ব্যবস্থার অভাবের জন্য তিনি পুঁথিগুলি সাহিত্য পরিষদকে দান করে দেন। তিনি পুঁথির অনাদর একেবারে

সহ্য করতে পারতেন না। তাই রবীন্দ্রনাথ পুঁথি সংরক্ষণ ও রক্ষণাবেক্ষণের দায়িত্ব দেওয়ার কথা ভেবেছিলেন ১৮ বছর বয়সের যুবক পুত্র রথীন্দ্রনাথ এবং সমবয়সী সন্তানসম সন্তোষচন্দ্র মজুমদারকে। সেই কারণে তিনি সংস্কৃত পণ্ডিত ও পুঁথিসংরক্ষণে যত্নশীল ও জ্ঞানী বিধুশেখর শাস্ত্রীকে শাস্ত্রনিকেতনে নিয়ে আসেন। পুত্র রথীন্দ্রনাথকে দেওয়া রবীন্দ্রনাথের একটি চিঠি থেকে এই ব্যাপারে ধারণা করা সম্ভব। তিনি লিখেছিলেন —

“আমাদের এখানে পুঁথির অনাদর নিয়ে তাঁর (বিধুশেখর) মন বড় ক্ষুন্ন আছে। অনেক পুঁথি বর্ষার সময়ে স্টেশনে পড়ে ভিজে damage হয়েছে, demarrage দিয়ে তাদের আনতে হয়েছে; কোন কোন পুঁথির উপরকার নতুন ভালো কাপড়ের মোড়ক চুরি গেছে, কেউ খেয়াল করেনি ইত্যাদি। এবার আমি ফিরে গিয়ে লাইব্রেরী ও আপিস সম্বন্ধে একটা পাকা ব্যবস্থা করব”।

এই সংরক্ষণের ব্যবস্থা ছাড়াও পুঁথি সম্পাদনা ও মুদ্রণের সাহায্যেও পুঁথি সংরক্ষণের আধুনিক পন্থা শুরু করেছিলেন। তাঁর এই কাজে অনুপ্রাণিত হয়ে দুই পণ্ডিত ও গবেষক হরপ্রসাদ শাস্ত্রী ও বসন্তরঞ্জন রায় বহু পুঁথি সম্পাদন করেন। বহু নতুন পুঁথি আবিষ্কার করেন। রবীন্দ্রনাথ ঠাকুর সহ পরবর্তীকালে বহু পণ্ডিত মানুষের এই সমস্ত কর্মকান্ড চলাকালীন ব্রহ্মচর্যাশ্রম (বর্তমান পাঠভবন) শুরু হলেও বিশ্বভারতীর প্রতিষ্ঠা হয়নি। তাই ঐ সময় গ্রন্থাগারই অভিলেখাগারের সমস্ত ভূমিকা পালন করত। পরবর্তীকালে পুঁথিশালা যা বিভিন্ন বাড়ি ঘুরে বর্তমানে ‘লিপিকা’ নিজস্ব গৃহ পেয়েছে যার মধ্যে প্রায় 4000 sq. ft.-এর মতো শীততাপ নিয়ন্ত্রিত Stag room বা Strong room, Reading room, Staff room, ২টি Seminars rooms ও Fumigation room, Digitization room, Computer room, Preventive ও Curative work -এর জন্য laboratory র সুবিধাযুক্ত tempourary store room সহ Preventive unit -এর acomodation প্রভৃতির সঙ্গে ঐ building ৩৫০ জন্য বসার ব্যবস্থাসহ শীততাপ নিয়ন্ত্রিত Auditorium বর্তমান, Staff -এর সংখ্যা পরিবর্তিত হলেও মোটামুটি —

- ▶ Administrative Incharge – 1
- ▶ Technical Assistant – 1
- ▶ Descriptive cataloguer – 1
- ▶ Preservation Assistant – 1
- ▶ Archive Attendant – 2

2010-এ এই কেন্দ্রীয় অভিলেখাগারটি উপযুক্ত ব্যবস্থাপনার জন্য Deputy Curator হিসাবে তৎকালীন Director, Rabindra-Bhavan আমাকে লিপিকায় পাঠান মূলতঃ Curatorial কাজ দেখার জন্য। তৎকালীন Administrative Incharge ডঃ বুদ্ধদেব আচার্য-র অভিজ্ঞতা সম্বল করে আমরা মিশে যাওয়া পুঁথিগুলোকে Acc-No. মাধ্যমে chronology -তে সাজাতে সক্ষম হই, মূল বাংলা ও উড়িয়া পুঁথিগুলি। সংস্কৃত পুঁথিগুলোর একটি পুঁথিতে অনেকগুলো করে নম্বর থাকার বিষয় বিশেষজ্ঞ ছাড়া সমস্যার সম্মুখীন মতে হয়। যাই হোক বর্তমানে আমাদের Director সংস্কৃত সাহিত্যের মানুষ হওয়ায় এবং পুরানো পুঁথির ব্যাপারে অধিক উৎসাহ থাকায় পুঁথিগুলোর Arrangement -এর ব্যাপারে বিশেষ ভূমিকা নিচ্ছেন। শুরুতে যেহেতু Preservation এবং Curatorial কাজকর্ম দেখার দায়িত্ব আমার উপর ছিল তাই পুঁথিগুলোর Proper house-keeping এবং Preventive measure -এর জন্য Proposal পাঠাই। যেহেতু আমাদের Almirah ও Rac গুলো সবই rusted এবং সমস্ত পুঁথিরই cover paper এবং rapping cloth acidied, dusted এবং damaged তাই বহু লক্ষ টাকার

materials এবং supporting staff -এর প্রয়োজন হয়ে পড়ে। তৎকালীন অভিজ্ঞ Director পুঁথিগুলি রাখার জন্য অত্যাধুনিক moving stag গোদ্রেজ কোম্পানীর থেকে ব্যবস্থা করলেন। এবং পুঁথিগুলো সঠিক Preservation-এর জন্য National Archive থেকে একটি Project আনার ব্যবস্থা করলেন। প্রকৃতপক্ষে National Archive -এর financial support -এ INTACH -এর ভূবনেশ্বর শাখা -এই গুরুত্বপূর্ণ দায়িত্বটি নিলেন। প্রায় ৩ বছর কাজ করে Project টি সদ্য শেষ হয়েছে এবং অধিকাংশ পুঁথিই Proper Preservation না হলেও মোটামুটি যত্নের ব্যবস্থা হয়েছে। Regular maintenance -এর মধ্যে dusting, regular interval -এ insecticide ও fungicide spray, termite treatment ইত্যাদির ব্যবস্থা আছে। লিপিকাতে scholar service excellent। তবে পুঁথির arrangement Accession No. অনুযায়ী না হয়ে subject wise হলে scholar -দের আরও বেশী উপকার হতো। তবে সংরক্ষণের ব্যাপারে একটি কথা না বললে পূর্বসূরীদের অপমান করা হবে। তাহলে এত অযত্নের পরও বহু পুঁথি আছে যার বয়স ২০০-৩০০ বছরের বেশী পুরানো কিন্তু কোন রকম ক্ষতি হয়নি। তার প্রধান কারণ পুঁথিগুলি যাতে নষ্ট না হয় তার জন্য কিছু Traditional Process অনুসরণ করতেন। বিভিন্ন ধরনের গাছ, পাতা, ঔষধি ব্যবহার করে, হলুদ, কালোজিরে, নিমপাতা, লবঙ্গ ও তার তেল, সিট্রোনীলা তেল, lemon grass oil ইত্যাদি দিয়ে পুঁথি সংরক্ষণও হতো আবার এই সমস্ত জিনিষ মানুষের স্বাস্থ্যের পক্ষে কোন হানিকর ছিল না। দক্ষিণ ভারতের তামিলনাড়ুতে সরস্বতী মহল লাইব্রেরী ও অভিলেগাগারটি এই traditional পদ্ধতি অনুসরণ করলেও আমরা পারছি না। যদিও বর্তমানে Senior Scientist বা যারা modern preservation -এর Research -এর সঙ্গে যুক্ত তারাও আমাদের দেশীয় traditional preservation -এর পক্ষে মত দিচ্ছেন। গুরুদেব ও বিধুশেখর শাস্ত্রী কিন্তু Traditional Preservation -এর পথকেই অনুসরণ করেছিলেন।

মূল্যায়ণ

বর্তমানে লিপিকার স্বর্ণযুগ বলা যেতে পারে। INTACH পুঁথিগুলিকে থাইমল পেপারসহ Acid free tissue paper বোর্ড এবং লাল কাপড়ে বাঁধিল করে দিয়েছেন। তিনটি Unit ও Duct সহ strong room -এ বাতানুকূল -এর ব্যবস্থা, প্রয়োজনের তুলনায় বড় building, National Manuscript Mission -এর সহযোগিতায় training cum workshop -এর ব্যবস্থা, computer, photocopier প্রভৃতি instrument বর্তমান। কিন্তু এতো আয়োজনেও বেশ কিছু ত্রুটি বর্তমান। যার ফলে ভবিষ্যৎ নাগরিকদের কাছে আমাদের অপরাধী হয়ে থাকতে হবে। যেমন —

- (১) Air condition আছে। তিনটি unit থাকায় alternatively চালানোর ব্যবস্থা আছে। তবে 24 ঘন্টা A.C. চালানোর ব্যবস্থা হয়নি। Switch গুলো strong room-এর মধ্যে আছে। এই ব্যাপারটি কতটা ভয়ানক তা Preservation -এর সঙ্গে যুক্ত যে কোন মানুষ বুঝতে পারবেন।
- (২) A.C. আছে Duct এবং -এর ব্যবস্থা আছে। কিন্তু A.C. -এর machine গুলো আছে strong room -এর False ceiling -এর উপর। যে কোন সময়ে fire hazard হতে পারে।
- (৩) Strong room -এর environmental monitoring -এর ন্যূনতম ব্যবস্থা নেই। Temperature, humidity, light measuring instrument -ও নেই।
- (৪) Strong room -এর light গুলি Incandescent Trastant lamp বাইরে একটা frosted glass আছে। কিন্তু প্রচুর temperature generate করে।

- (৫) শাস্তিনিকেতনে humidity সারা বছরই প্রায় ৪০% -এর উপর থাকে কিন্তু strong room -এ dehumidifier নেই।
- (৬) রবীন্দ্রভবনে CCTV এবং Infrared system security-এর ব্যবহার হলেও লিপিকাতে ব্যবস্থা হয়নি।
- (৭) Regular interval -এ fumigation -এর ব্যবস্থা নেই।

এই রকম বহুবিধ সমস্যা এখনো আছে। তবে বিশ্বভারতী প্রশাসনিক প্রধানরা পাঁচ বছর অন্তর পরিবর্তন হয়। বর্তমান প্রশাসন ভীষণভাবে সক্রিয় ও সচেতন। আশা করি কোন সদর্থক রাস্তা তাড়াতাড়ি বের হবে।

গ্রন্থপঞ্জী

ডট্টাচার্য, গৌতম (সংকলিত), (২০০২), আশ্রমকথা, কলকাতা : বিশ্বভারতী গ্রন্থন বিভাগ।

মুখোপাধ্যায়, প্রভাতকুমার। (১৩৬৬)। রবীন্দ্রজীবন কথা। বিশ্বভারতী।

পাল, প্রশান্ত। (২০০০)। উত্তরায়ণ রবীন্দ্রভবন। কলকাতা : বিশ্বভারতী গ্রন্থন বিভাগ।

রায়, বিশ্বনাথ। (১৩৯৯)। প্রাচীন পুঁথি উদ্ধার : রবীন্দ্র উদ্যোগ। কলিকাতা : কলিকাতা পুস্তক বিপণি।

Jeyaraj, V. (2002). Care of paintings, Chennai Government Museum।

পালচৌধুরী, শশ্বতী ও বন্দ্যোপাধ্যায়, স্বপ্না (২০১০), পুঁথি সংগ্রাহক রবীন্দ্রনাথ। Calcutta University journal of Information studies, Vol XII কলিকাতা বিশ্ববিদ্যালয় : গ্রন্থাগার ও তথ্যবিজ্ঞান বিভাগ। pp. 67 – 69।

The Coins and Currency Preserved in the Taka Museum of Bangladesh Bank: Their Ramification with Historical Perspective

MD. AMIRUL ISLAM

Economy is the most significant aspect of any society, not only for the present day but also for the past. When we study any ancient society or civilization, at first we study the development of that society. To do this, we consider the economy of that society as the basis of all kinds of analysis regarding it. The study of economy of the past helps us to discover the life style, social life, advancement in technology, trade and trade route, political situation, etc. However, the most visible unit of the economy of ancient society is its medium of exchange. This exchange could be of any particular goods or in many cases a metallic piece of standard weight which we know as currency. Currency is a medium of exchange in a very significant form which is circulated by an authority. For almost every ancient society, a piece of metal (in most case round shaped) with the authentication of the supreme authority of the region was used as a form of currency which is known as coin. Although in some parts, shell was used as currency. Numismatic is a one of the important discourses of archaeology and it should be considered as trustworthy source for the study of the history of civilization.¹

At present day, the central bank of a country is the authorized organization for issuing coin and paper money as a currency for the circulation within that country. Central bank belongs the monopoly right in issuing the currency for the country which usually serves as the nation's legal tender.² It also controls the monetary system, foreign currency reserve, reserve of gold, etc., and issues guidelines for the economy of a country. Central bank not only issues money or deals with the bank but also measure the future aspects of economy, decides the interest rates, stabilize the exchange of foreign currency. It is also a moral responsibility of a central bank to research and to preserve the history and development of economy and monetary system of a country. The perfect way to do this is to establish a currency museum and to make it an important part of central bank.

Museum is an institute that conserves a collection of objects of scientific, artistic, cultural or historical importance and makes them available for public viewing through exhibits that may be permanent or temporary.³ By establishing a museum at central

bank, it is easy to fulfill the moral purpose of research and let people to know about the economic heritage and currency system from Ancient to present time. Museum can be various types but a central bank museum should be focused on numismatics. From this philosophy, many central banks have established currency museum to preserve the monetary history of their own and also the world. These museums have opened an opportunity for the researchers and especially for the general people of a country to explore and to observe the currency system of their own and also keep in touch with the diversity of coin and paper note of other countries.

Inspired by all these, Bangladesh Bank has inaugurated its central bank museum named as 'Taka Museum' (formerly known as Currency Museum) on 05 October 2013. The activities and steps of preparations of Bangladesh Bank were announced when the foundation stone was laid by Prime Minister Sheikh Hasina on 27 April 2013. The Taka Museum Establishment Committee directly coordinated by the Governor of Bangladesh Bank Dr. Atiur Rahman has done a great job in establishing such a rich and modern museum within a very short period of time. The members of the committee are Artist Hashem Khan, Professor Muntassir Mamoon, Architect Robiul Hossain and Mr. Das Gupta Ashim Kumar, who are all very experienced scholars and appropriate persons for establishing such a museum. They worked hard to establish this museum. Many prominent and general people help to enrich the artifacts collection for the museum. As an early initiative for establishing a museum, Bangladesh Bank handed over Bangladeshi coins and banknotes from 1972 to present time. At present, this museum is installed at the first floor of the Bangladesh Bank Training Academy (BBTA) situated at Mirpur, Dhaka. To collect and preserve currencies of Bengal and the subcontinent from ancient time to present time is one of the main objectives of this Taka Museum.

The museum is open for all from 11 am-05 pm from Saturday to Wednesday and from 04 pm to 07 pm on Friday. The museum remains closed on Thursday. No ticket is needed to visit the museum. The museum building is a good example of modern architecture. The first floor where the museum is situated is highly decorated. This museum is the most decorated and well furnished and probably the first fully air conditioned museum in Bangladesh. The wall of the building is decorated with terracotta murals where the development of currency has shown in an artistic way which is also visible from the main public road. Again in few steps towards the building, one can find a statue named 'Tree of Taka' (Taka Gach in Bengali) with the presentation of metallic replica of different coins from ancient to modern period of Bangladesh which will attract the visitors and also create an excitement to visit the Taka Museum. After walking through an open archway from ground level towards few feet higher level, one can get a stair leading to the first floor for visiting the museum.

The museum is divided into two galleries. One is large in dimension and the other is small. The large gallery is meant for the presentation of the total history of

the rise of currency from the ancient to modern period of Bangladesh. This gallery is divided into eight sections. The exhibition-cases have been decorated chronologically from section one to section eight. Every section consists of few showcases. The section one has started just after the entrance of the gallery from the northern side which can be titled as Development of Ancient Coin in Bengal. In this section there are three showcases which present the earliest evidence of coin known as punched marked coin circulated in the Mahasthangarh (Fig.: 1) region of Bangladesh. And then chronologically 27 copper coins (Fig.: 2) of the Kushan dynasty have been kept. There are also 5 Indo-Greek and Indo-Persian coins. Recent study revealed that punch marked was circulated in the Mahasthan region during the 3rd -1st century BC.⁴

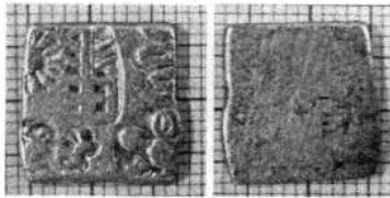


Fig. 1. PMC coin



Fig. 2. Kushana coin

These punched marked coins consist of various symbols. Till now at least 214 symbols have been identified on the punch marked coins found in Bangladesh.⁵ Although it was not confirmed that the Kusanas could able to establish their rules in Bengal but some gold and copper coins were discovered from Bengal. It could be possible that those coins were come through trade.⁶

In the third showcase, there are a collection of 4 bull type Harikela coins (Fig.: 3). In the lower part of this showcase, 5 necklaces ornamented by coins of the Colonial and Pakistan period have been kept. In this case there are also some shells (Fig.: 4) which are believed to be circulated in Bengal as a medium of exchange during the Pala-Sena period.⁷ Harikela coins were circulated in the Chittagong, Comilla and Shylhet region during 7th-8th century AD and those were influenced by the silver coin of Arkans.⁸ Shell was used as a medium of exchange from the ancient period to 19th century AD in Bengal for daily buying-selling. In the Maryan period, 1280 shells were equivalent to 1 Karsapana (1 silver coin of 32 *ratti*). In Gupta period, 20480 shells were equivalent to 1 Niska (Gold coin).⁹



Fig. 3. Harikela coin



Fig. 4. Shell

Section two is just the few feet right to the section one which can be titled as Coins of Medieval Bengal (1205-1757). The coin of Medieval Bengal is the main source to construct the history of Medieval Period in Bengal. Here the coins of Indian Sultan Alauddin Khalji (Fig.:5), Giasuddin Tughlaq and Muhammad bin Tughlak have been presented. After that the coins of the Independent Bengal Sultans from Fakruddin Mubarak Shah (Fig.: 6) to Giasuddin Mahmud Shah, Afghan ruler Sher Shah Sur are presented (Fig.: 7). Bengal was independently ruled by the sultans for 200 years constantly from 1338 to 1538 AD. In the last showcase, there are coins of the Mughal emperors Akbar the great, Jahangir, Shahjahan (Fig.: 8) and Aurangzeb. There are also some coins of the Subadar of Dhaka. As Dhaka was a suba (province) of Mughal Empire.



Fig. 5. Coin of Alauddin Khalji



Fig. 6. Coin of Fakruddin Mubarak Shah



Fig. 7. Coin of Sher Shah



Fig. 8. Coin of Shahjahan

The third and fourth section is located at the south wall of the gallery. The third gallery has the collection of the coin of Kuch Bihar and Assam of the Medieval Period. There are also 14 rare and historic banknotes, 67 coins of British Empire ruling in the subcontinent. The fourth section is the collection of coins and banknotes of Pakistan of pre-1971 period (1947-1971). In this section, there is a presentation of a heart-breaking story of a person named Ganendro Nath Mohantho during the liberation war of Bangladesh in 1971. The banknotes of some abolished countries or regimes such as China (before 1949), USSR, Russia (before 1910), Yugoslavia and Czechoslovakia have also been shown here. Section fifth to section seventh is horizontally located at the middle of the gallery. In this part, the varieties and the phases of development of coins and banknotes of Bangladesh from 1972-2013 have been shown according to denomination. There are also all the commemorative coins and banknotes (04 banknotes & 12 coins) of Bangladesh Bank (Fig.: 9-10). Section eight is located at the eastern wall of the gallery. On this section, the use and development of medium of exchange in the rural area of Bangladesh has been shown by three dioramas (Fig.: 11-12).



Fig. 9. Commemorative coin



Fig. 10. Commemorative coin



Fig. 11. Diorama



Fig. 12. Diorama

The second Gallery is just a few steps through a closed lane, and it is well decorated with various vaults used in countryside in the past years, and also with some paintings. The second gallery has three sections. All these sections present circulated banknotes, coins and commemorative banknotes of different countries. Both the galleries are decorated with many paintings by prominent artists and banner, festoons which have given this museum an artistic look.

Bangladesh Bank has tried its best to use the modern technology to attract this museum for the visitors and make it useful. Digital kiosk, digital signage, projector, TV screen, Photo kiosk etc. are installed here. All these have made this museum special and different from any other museums of Bangladesh. In the gap between two sections there are some TV screens which show documentary on the history and development of monetary system in Bangladesh, different useful information to identify the fake banknotes, security thread, names of the contributors to enrich the collection of the museum and other banking information. Both galleries have a space for the presentation by projector to show documentary on Coin and Currency. All the collection (both Bangladesh and foreign currency) of Bangladesh Bank Taka Museum, their information, information of school banking, history of coin and currency have been stored in digital version. Anyone can explore with the touch of finger to know the details about all these. This creates an option for the knowledge hunting people to know much about the collection of objects of the museum without the help of a guide. There are six digital-signage (four in the first gallery and two in the entrance of the first gallery) in the museum. It is really interesting to establish two photo kiosks at the second gallery where anyone can print a customize souvenir banknote of 1 lac denomination with the photograph of his/her own. That is really exciting for anyone.

At the outside of the second gallery, there is a souvenir shop. Visitors can buy various commemorative coins, banknotes, publication and other souvenirs issued by Bangladesh Bank. It will help the numismatics collectors to enrich their collection easily.

Although this is the first ever currency museum in Bangladesh and a new one, there is so much scope to improve the museum from the visitors. There have some problem with the spot light of each showcase. If a visitor observes an object from various angles, the spot light reflects on the white stage and creates disturbances and reduces the interest of that visitor and therefore he/she is compelled to move to see another object. Changing the color of the stage of each showcase or using a less powered light can reduce the problem. At the second gallery in all the sections, the banknotes and coins have been presented in a scattered way only with the name of the country. Those can be formed in a certain pattern. In the banknotes showcase there are many specimen banknotes but no information has been given

to understand the basic difference between a specimen and normal banknote.

Now the museum has only two galleries but if the museum can be extended to the upper floor that can create the opportunity to increase the number of galleries as Taka Museum has much more collection of objects from Bangladesh and worldwide which are important to show the development of the history of the economy, coin and currency system but these couldn't be shown for the lack of space. A section can be created for showing the process of the making of banknotes and coins because people are very much interested to know about those. From the designing to the printing of a banknote or the total process of making a coin can be shown here. A gallery on the history of banking in Bangladesh with the presentation of earliest banking documents of various banks can also be added. The development of banking system also can be shown here. There is no different section for polymer or hybrid banknotes in the museum. Now a day, these banknotes are very popular, so a section can be created with a collection of polymer and hybrid banknotes of different countries. In many countries central banks have issued bi-metal coins that can be added to another section. This type of section will be interesting for the visitors and give them a scenario of the diversity of coins and banknotes worldwide. There are many countries of the world which are no more existed. A section can also be arranged to show the coin and currency of those lost countries. A library is very much needed to make the museum more appropriate for the researchers. The library should be specialized for the collection of books, magazines, bulletin and journals on numismatics, minting, economy, archaeology and history. The museum can publish journal on Numismatics and the history of economy and monetary system which will help and encourage the researchers of these fields. The museum can also yearly arrange numismatics exhibition in national and international level where numismatics collectors can show their collection which will help to increase the hobby of numismatics among the general people specially the children.

From the above discussion we conclude that as a thematic museum the Taka Museum is in initial stage. With in a short period of its establishment the museum has able to collect a good number of coins and banknotes. The museum has already attracted the general people, students, researchers and numismatic collectors. We hope that this museum will also serve as a research support centre for numismatics, archaeologists and historians for conducting various researches. As this is the first ever coin and currency museum in Bangladesh, we are really looking forward to see more developments and initiatives from the museum authority.

Notes and References

¹ Poole, Stanly Lane (ed.), 1968. *Coins and Medals in History and Art*, Chicago, Argonaut Ins. Publishers, p. 3.

- ² Sullivan, Arthur, Steven M. Sheffrin, 2003. *Economics: Principle in Action*, New Jersey, p. 254.
- ³ Alexander, Mary, Edward Porter, September 2007. *Museums in Motion: An introduction to the history and functions of museums*, Rowman & Littlefield.
- ⁴ Bulbul Ahmed and Md. Noorul Islam. 2011. *The Mahasthan Hoard II of Silver Punch-Marked Coins*, (jointly with), Asiatic Society of Bangladesh, Dhaka.
- ⁵ Bulbul Ahmed. 2010. Symbols on the Silver Punch-marked Coins Found In Bangladesh. *Journal of Bengal Art* (Journal of the International Centre for Study of Bengal Art) 15: 211-242.
- ⁶ Bulbul Ahmed. 2012. 'Documentation of Kushana Coins found in Bangladesh' a paper presented in the Faculty of Arts and Humanities, Jahangirnagar University, Savar, Dhaka in 10 September 2012.
- ⁷ Roy, Niharranjan, 1993. *Bangalir Etihash: Adi Parbo* (History of Bengalis: Ancient Period), Kolkata, p. 164.
- ⁸ Chakravarti, Ranabir, 2003. Coins, *Banglapedia*, CD Edition, Shirajul Islam (Ed.), Dhaka, Asiatic Society of Bangladesh.
- ⁹ Mukherjee, B.N., 1992. *Coins and Currency System in Gupta Bengal (c.A.D. 320-550)*. New Delhi, p. 58.

History & Heritage

Ganesha: the auspicious ... the beginning, unravelling an enigma

SUMANA DUTTA

Introduction

Ganesha (Sanskrit : also spelled *Ganesa* or *Ganesh*) is one of the best-known and most popularly worshipped deities in *Hinduism*. Although he is known by many other attributes, *Ganesha*'s elephant head makes him easy to identify. Several texts relate mythological anecdotes associated with his birth and exploits, and explain his distinct iconography. *Ganesha* is worshipped as the '**Lord of Beginnings**'; as the '**Lord of Obstacles**' the patron of arts and sciences and the God of intellect and wisdom. He is honoured with attention at the start of any ritual or ceremony and invoked as the '**Patron of Letters**' at the beginning of any writing. So, who is *Ganapati/Ganesha* ? *Ganapati* is the self. In a sentence, *Ganesha* simply means, "**self-realization is but the removal of obstacles to the recognition of the eternal, immanent, inner self, here and now.**" *Ganapati* literally means "**Leader of Ganas**". The word '*Pati*' here is used as '*Leader*' and not as husband, which is its other meaning. *Ganas* are the attendants of *Shiva*. He has 108 names, such as - *Avighna, Balaganapati, Buddhinath, Dharmik, Ekadanta, Gajakarna, Haridra, Kapila, Mahaganapati, Nideeshwaram* etc.

Ganesha appears as a distinct deity in a clearly recognizable form beginning in the fourth to fifth centuries A.D., during the Gupta Period. His popularity rose quickly. The earliest sculptures of *Ganesha* might have been made during the Kushana period or the beginning of the Gupta period, at the end of the 3rd century. They were later found in all regions of India from around the 5th century. Today, *Ganesha* is one of the most worshipped divinities in India. Worship of *Ganesha* is considered complementary with the worship of other forms of the divine, and various Hindu sects worship him regardless of other affiliations. The devotion of *Ganesha* is widely diffused and it extends to *Jains, Buddhists* and others beyond India.

A minor but popular *Hindu* deity of *Bengal* is the elephant-headed *Ganesha*, who is shown seated or standing, but a delightful form of the god shows him dancing, and this form of *Ganesha* from Bengal excels the forms of the deity from other parts of the subcontinent. *Ganesha* appears as an independent deity, but sometimes he is shown with '*Lalita*' (a special form of *parvati*), with *Gauri* and *Shiva*, with the '*Matrikas*' (Mother goddesses) and with the '*Navagrahas*' (nine planetary deities). *Ganesha* appears also in Buddhist context in the *Paharpur Temple* and *Halud Vihara* in *Bangladesh*.

The Incarnations of Ganesha

According to the *Mudgala Purana* (20/5-12), there are eight incarnations of *Ganesha*. Most of his lives seem to involve slaying demons. However, each lifetime was different in some way and his mode of carriage (the animal he rode) changed in certain lifetimes - in one life, he rode a *Peacock* and in another, he traded his ever-reliable *Mouse*. There is an easy to notice symbolic function in these eight incarnations. In each lifetime, *Ganesha* fought against and subdued a different demon. Each demon relates to a flaw in human nature, something, which needs to be overcome before one, can become a Higher Man. The eight weaknesses, which *Ganesha* spent eight lifetimes overcoming, are ***Jealousy, Drunkenness, Illusion, Greed, Anger, Desire, Egotism, and Self-infatuation (arrogance)***.

These eight incarnations are :

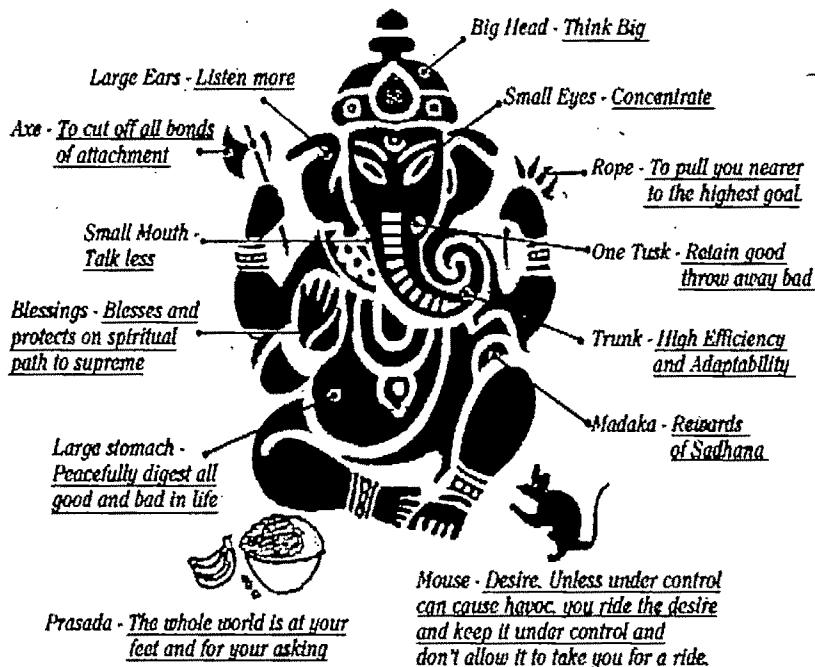
- (1) ***Vakratunda*** – “the Lord with the curved trunk”. He is represented seated on a *Lion*. He came to struggle against the devil ***Matsarasura*** or ***Matsara***, who is the symbol of ***Jealousy***.
- (2) ***Ekadanta*** – “the Lord who has only one tusk”. Exterminated ***Mada*** or ***Madasur***, the demon of ***Drunkenness***. And his vehicle is the mouse.
- (3) ***Mahodara*** – “the Lord who has a big belly”, gives battle to ***Mohasur*** or ***Moha***, the demon of ***Illusion***. Once again, his vehicle is the mouse.
- (4) ***Gajanana*** – “the Lord with an elephant face”, put ***Lobhasur*** or ***Lobha*** (son of *Kuber*), the demon of ***Greed***, to death. His vehicle is the mouse.
- (5) ***Lambodara*** – “the Lord with a protuberant belly”, masters ***Krodha***, the demon of ***Anger***. His vehicle is the mouse.
- (6) ***Vikata*** – “the misshapen”, subdued ***Kama*** or ***Kamasur***, the demon of ***Desire***. Interestingly, *Ganesha* traded in his mouse vehicle to ride a *Peacock* in this manifestation.
- (7) ***Vighnaraja*** – under the form of *Vighnaraja*, “the Lord King of Obstacles”, lying on *Sheshnaag* or *Shasha*, the *Snake of Eternity*, *Ganesha* destroyed ***Mamasur***, also known as ***Mamtasur*** or ***Mama***, the demon of ***Ego***.
- (8) ***Dhumravarna*** – finally, the last *Ganesha* incarnation is *Dhumravama*, “the Lord with a tawny colour”, riding on a *Mouse*, who got victory over ***Ahamkara*** (***ahamkarasur*** or ***Aham***), the demon of ***Self-infatuation***.

However, according to the *Ganesha Purana*, four *Ganesha* incarnations came on earth during the different periods (*yuga*), in order to fight the devils. They are:

- (1) ***Mahotkata*** – with ten arms, seated on a *Lion*, shining like the Sun, came during the ‘***Krita Yuga***’ to kill the demons ***Narantak*** and ***Devantak***.

- (2) **Mayureshvar** – white-coloured *Shri Mayureshvar* with six arms, riding the Peacock, faced the demon **Sindhu** during the '**Trela Yuga**'.
- (3) **Gajanana** – red-coloured *Shri Gajanana* with four arms, mounted on his rat, destroyed the demon **Sindur** during the '**Dwapara Yuga**'.
- (4) **Dhumraketu** – is the form of *Ganesha* who will come in the future; we are now living in the '**Kali Yuga**'. Two-arms and smoke-coloured *Dhumraketu* will ride on a *blue horse*; he will fight all the devils to restore peace and harmony in the world.

The **Ganesha Purana** and the **Mudgala Purana** mentions about this avatar of *Ganesha*, which has striking similarities with the '**Kalki Avatar**' of *Vishnu*. This final avatar of *Ganesha* is yet to take place. **Ganesha Purana** states that he will appear to annihilate the demon named **Abhimanasura**. Symbolically the demon represents the pride and attachment in the human beings. This is believed to be a fierce form of *Ganesha* and he will ride on a *blue horse*. In this form, he will bring an end the '**Kali Yuga**' and will clean up the universe for the next cycle of creation.



Symbolism of Ganesha

Ganesha in World Religions

Ganesha has been a major deity, since the seventh and eighth centuries, in Thailand, Cambodia and Vietnam. *Ganesha Buddha* – as he is also known as '**Shoden**' in Japan. It is from '**Vinayaka**' that the old Myanmar name for *Ganesha*, **Mahapinaryapurha**, was derived. Other names with a similar meaning occur frequently in Cambodian inscriptions, such as '**Vighnesha**' and '**Vignesvara**', both of which mean "**Lord of removing obstacles**". A popular temple at *Futako Tamagawa*, Tokyo, Japan, displays *Ganesha* far more prominently than *Buddha*. *Ganesha* was extremely popular in the art of Indonesian islands, especially of Sumatra and Java and compare favorably with the eighth century images, their styles and iconography of the Ellora caves. At **Chandi Sukuh** in central Java, a remarkable fifteenth century relief shows three figures, with a dancing *Ganesha* in the centre. There are paintings and stone sculptures of the deity found in China, a part from the textual references to *Ganesha* in the *Chinese Buddhist* canon.

In Japan, there is the **Shingon** ritual practice that centers on *Ganesha*, with texts tracing back to China. To some Chinese, he is '**Kuan-shit'ien**' or '**Ho Tei**', the large-bellied "**God of Happiness**". To the Polynesians he is '**God Lono**'. The Tamils call him by the affectionate term '**Pilliar**', **Noble Child**. The Tibetians know Him as '**ts' ogs-bdag**', and the Burmese worship '**Maha-Pienne**'. In Mongolia, His name is '**Totkhar-our Khaghan**'. Cambodians offer worship to '**PrahKenes**', and the Japanese supplicate '**Vinayaksa**' or '**Sho-ten**'. By some, he is envisioned as the feminine Mother Nature, and even non-believers seek to understand Him through personifying His great powers as *Fate, Destiny or Numen*. The Greeks called Him '**Janus**' and sought His blessings at the outset of any new venture. In Greece, '**Janus**', the god in Greek mythology after whom the month of *January* was named, has the head of an elephant. Sometimes, he is depicted as a two headed deity. Like *Ganesha*, '**Janus**' is worshipped at the beginning of any auspicious occasion.

Ganesha is the most widely worshipped deity in India. *Ganesha* also becomes the most versatile in appearance. The lack of restrictions on his iconography means that each *Ganesha* can reflect local aspirations. According to legend, Asoka's daughter *Charumati* built a temple for *Ganesha* in Nepal and the earliest surviving *Ganeshas* in Nepal belong to the 8th century. '**Vinayaka**' dances, a rat or lion under each foot, multi-armed, carrying several *tantric* symbols including a radish, and is canopied by the snake. This form is also found in Mongolia, where *Ganesha* travelled with the Tibetan monk **P'agspa**.

In the Gupta period, *Ganesha* travelled east to Burma, Thailand, Cambodia, Indonesia and Borneo – with **Hinduism** and **Buddhism**. In the **Tibetan Buddhism**, the practice associated with *Ganesha*, as *Buddhist tantric* deity, survives up to this day. In Tibet, *Ganesha* is placed above the entrance of Buddhist monasteries or

painted on the doors, often holding a trident and identified with Shiva. In **Jainism**, *Ganesha* occasionally found a place alongside *Mahavir*. The **Tibetan Ganesha** appears, besides bronzes, in the resplendent '**Thangka**' paintings alongside the *Buddha*. In a single Kathmandu valley of Nepal, there are four principal manifestations of '**Vinayak**' like *Ashok*, *Surya*, *Chandra* and *Vighna* in protective role. In that valley, *Ganapati* guards the **Buddhist Viharas** where '*bhajans*' are sung in his praise. In Sri Lanka, the oldest image of *Ganesha* is found in the **Kantak Chaitya** in **Mihintale**, which is dated to 1st century BC. The *Ganesha* idol at **Subrahmanyam Temple** in **Katargama** town is still worshipped. People who do not practice *Hinduism* also visit this temple for this *Ganesha* is believed to grant wishes to his devotees. *Ganesha* is a vibrant presence whose benediction is sought by traders, travelers, artists and public officials. As Lord of business and diplomacy, he sits on a high pedestal outside **Bangkok's World Trade Centre**, where people offer flowers, incense and a reverential *sawasdee*.

The earliest elephant-headed human figure appears on a plaque found in **Luristan** in **Western Iran**. Dating back to between 1200 and 1000 B.C., this *proto-Ganesha* stands dressed as a warrior, holding a sword and a snake in one hand and a quill in another, a multi-hooded snake at his feet. A marble '**Malia Vinayaka**' (partly destroyed) was consecrated by **King Shahi Khingala** in the 5th century A.D. in **Gardez** in **Afghanistan** and an earlier undated *Ganapati* was worshipped in **Sakar Dhar**. Since Afghanistan was once a land of *Hinduism* and *Buddhism*, there were probably other *Ganesha* images in Afghanistan that were later destroyed.

In **Khotan** or **Chinese Turkēstan**, *Ganesha* was painted on wooden panels and bronze tablets at **Khaklik**, the **Endere Stupa** and the rock-cut temples of **Bezaklik**. From Khotan, *Ganesha* reached **China**, and the earliest Chinese image of *Ganesha* is found at **Kung-hsien**, a two-armed seated figure holding a lotus and a '*chintamani*' jewel. Dated to A.D. 531, this image is described as the "**Spirit King of Elephants**".

The **Chinese** and **Japanese** knew two forms of *Ganesha*: '**Vinayaka**' and '**Kangiten**', the latter being a secret esoteric form of the deity. '**Kangiten**' symbolized "**the union of the Individual with the Universal Spirit**" and consists of two *Vinayakas* embracing each other. Another form, '**Vajra Vinayaka**' or '**Kakuzencho**', had three heads with three eyes, holding a sword, radish, scepter and *modak*.

Female form of Ganesha or "Ganeshani"

Vainayaki or **Ganeshani**, the "**Sakti of Vinayaka or Ganesha**", is a comparatively less known goddess in Indian iconography. Even as the female energy of *Vinayaka*, one of the five major gods of the Hindu pantheon, her worship was not much popular in ancient India. It was probably due to the rise of the **Ganapatya** cult,

Yogini worship and **Tantricism** that **Vainayaki** also came to be regarded as an important female deity during the early mediaeval period. Some *Puranas* and other scriptures mention *Vainayaki* in the list of the *Yoginis* and other goddess. Several *Jaina* and *Buddhist* literary works also enumerate interesting details about the goddess.

Also in **Madurai**, *Ganesha* is worshipped as '**Vyaghrapada Ganeshani**' in female form with tiger feet. Some say that this form belongs to the **Rudra Ganas**. We also see the description of the female form of *Ganapati* in the **Mantra Shastras**. This form is also called as '**Vallabha Ganeshani**'. This form has not gained much popularity. The *Ganeshani murti* in '*sukhasana*' pose resides at **Suchindrum**. There are two other temples in India with the female *Ganesha* form. One is at a tenth-century temple dedicated to **sixty-four Yoginis** in **Bheraghat**, a village near Jabalpur. The other is the **Tanumalaya Swami Temple** in **Suchindrum, Kerala**. In **Tibet**, She is worshipped as **Gajanani**.

Conclusion

Research has been done on the origin, mythological concepts and development of *Ganesha* of Indonesia, Thailand, Japan and Vietnam and so on. A number of scholars like Alice Getty, T.A. Gopinatha Rao, Amal Sarkar, I. K. Sharma, R.P. Yadava, A. K. Narain, Paul B. Courtright, A. Banerji, M.K. Dhavalikar, Edi Sedyawati etc. have produced good monographs and papers on *Ganesha* images. These works have a great importance to know the history of past. These historic evidences, sculptures of *Ganesha* tell us the progress of human civilization of our country. It reconstructs the origin and development of *Ganesha* images in India and helps achieve new insight into it.

References

- Banerjee, Jitendra N. (2002). *The Development of Hindu Iconography*. New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd.
- Das, Mamata. (1996). *Origin and Development of Ganesha in the Puranas*. Berhampur, Orissa: M/S Upagupta Publications.
- Das, Subhamoy. *Ganesha: Lord of Success - About the Hindu Elephant-Deity*. (n.d.). Retrieved March 12, 2012 from hinduism.about.com/od/lordGanesha/a/Ganesha.htm
- Ganesha in world religions*. (n.d.). *Wikipedia, the free encyclopedia*. Retrieved May 17, 2012 from en.wikipedia.org/wiki/Ganesha_in_world_religions.
- Getty, Alice. (1936). *Ganesha: A Monograph on the Elephant-Faced God*. (1992 reprint edition). Oxford: Clarendon Press. ISBN 81-215-0377-X. Chapter 4: "Ganesha in Buddhism".
- Gill, N. S. *Ganesha: Hindu Elephant-Headed God*. (n.d.). Retrieved March 12, 2012 from ancienthistory.about.com/library/dailygod/blg060822.htm

Gupte, R.S. (1972). *Iconography of the Hindus, Buddhist and Jains*. D.B. Taraporevala Sons & Co. Private Ltd.

Hindu Wisdom: Symbolism in Hinduism. source: Ganapati: Song of the Self - By John A Grimes, p.194. (n.d.). Retrieved December 02, 2011 from www.hinduwisdom.info/Symbolism_in_Hinduism.htm

Nagar, Shantilal. (1998). *Indian Gods and Goddesses: Early Deities from Chalco lithic to Beginning of Historical Period v.I.Delhi*: B.R Publishing Corporation.

Nagar, Shanti Lal. (1992). *The Cult of Vinayaka*. New Delhi: Intellectual Publishing House. ISBN: 81-7076-043-9. Chapter 17: "The Travels Abroad".

Redig, I. Wayan. (1996). *Ganesa Images from India and Indonesia*. Delhi: Sundeeep Prakashan. ISBN: 81-85067-96-1.

Sharma, B.N. (1979). *Iconography of Vainliyaki*. New Delhi: Shakti Malik, Abhinav Publications.

Yadav, Nirmala. (1996). *Ganesa in Indian Art and Literature*. Jaipur: Publication Scheme. ISBN: 81-86782-05-2. etc.

Adi Ganga: the Palaeo Channel of Bhagirathi-Hooghly

SARBANI HALDER

Introduction

With plenty of rivers flowing all across Bengal since ages, each has its own history and untold stories. These rivers enrich the culture and heritage of Bengal since centuries past. One of these rivers is the Adi Ganga, which is also known as Gobindapur creek, Surman's Nullah and Tolly's Nullah. As the Ganga represents a spiritual, cultural and historical continuity for this country, the Adi Ganga evokes similar feeling for the southern parts of West Bengal. It was the main flow of the Hooghly River from the 15th to 17th century.

History of the river

The earlier course of the lower Ganges was somewhat different from what it is in the present time. Early in the 16th century, the main course of the Ganges shifted eastward to the present Padma may have been due to some tectonic changes and natural calamities, leading to changes in the course of lower Ganges. The lower part of the Ganges, which is known as the Bhagirathi branched into three streams at Triveni near Bandel. The first one is the Saraswati, flows in a southwestern direction, past Saptagram. The second is the Jamuna (it is not the same river present in the north India) flows in a southeastern direction. The last one is Hooghly, flowed in the middle. The Hooghly glided down to around the place where Kolkata now stands and then flowed through the Adi Ganga, past Kalighat, Baruipur and Magra to the sea.

In the 16th century, a change occurred in the course of the Bhagirathi. The main waters of the Bhagirathi, which earlier used to flow through the Saraswati, began to flow through the Hooghly. The upper Saraswati become a dry river and the Hooghly abandoned the Adi Ganga channel and mixed the lower-course of the Saraswati to flow to the sea.

Present course of the River

The Adi Ganga now flows by Alipore, Tollygunge, Azadgarh, Rani Kuthi, Netaji Nagar, Bansdroni, Naktala, Garia, Narendrapur, Rajpur, Harinavi, Kodalia, where it is also known as the "Tolly Nullah", then Mahinagar, Dakshin Bishnupur, Chhatrabhog and Khari. The course of the river is clear up to Khari. Then it meets with the

Gobdia River (Gobdia Gang). The Gobdia Gang meets with the Ghibati River in the south, the Ghibati River being the drainage line which moves through Kakdvip and falls into the Bay of Bengal.

Archaeological aspects of the river

Archaeological features have been unearthed from riverbed and levee deposits of the Adi Ganga. The features are archaeologically advanced and they represent mainly metal idols of God and Goddesses, pillars of temples, break structures, pots, jewelry, barbed bone harpoon, remnants of temples and trade boats etc. These are associated with bones, horns, skull and teeth of wild extinct animals. A collection of some archaeological features obtained from deep pond digging can be seen preserved in the Tripureswari Temple of Boral, south Kolkata. The above findings suggest existence of 400 B.C. – 1200 B.C. human settlements in the riverbanks of South Bengal. From it, one can be assumed that international sea trades along the Adi Ganga once meandered through thick Sundarban forests before debouching in to the Bay of Bengal and are now nonexistent.

Some of the important archaeologically findings on the banks of the Adi Ganga are :

Boral : Maurya-Sunga, Kushan and Gupta terracottas have been found in abundance along with some sculptures of the Pala-Sena period.

Atghara : It is situated near Baruipur on the east course of the Adi Ganga. A large number of terracotta sculptures of the Gupta period are excavated from here.

Dakshin Bishnupur : A fine collections of Gupta terracottas and a few other types of antiquities have been excavated from here.

Chhatrabhog-Khari area : This area is located on the left bank of the Adi Ganga. Brick medallions with lotus designs are found in abundance in the village, suggesting the existence of ancient or mediaeval architecture.

Historical and cultural aspects of the river

Mention of the Adi Ganga can be found in *Manāsamangal*. In his *Manasamangal*, Bipradas Pipilai has described the journey path of Chand Saudagor, a merchant, touching Chitpur, Betore, Kalighat, Churaghat, Baruipur, Chhatrabhog, Badrikunda, Hathiagarh, Choumukhi, Satamukhi and Sagarsangam. The description of Bipradas Piplai tallies to a large extent with Van den Brouck's map of 1660. The temple of Chand Saudagar near Garia Smashan also confirms that the place was an important trading centre. Shri Chaitanya Dev, a major religious preacher of Eastern India, according to his contemporary biographies, also travelled to this route to reach Puri.

During that time, waterways were the common trading routes. For this purpose, river Adi Ganga touching Kalikhetra was an important route to the Bay of Bengal. These traders used to offer pujas to the various temples situated at both banks, among these Kalighat is the most important one.

When the Portuguese first started to frequent Bengal, around the year 1530, the two great centres of trade were Chhatagram, then known as Porto Grande or Great Haven, in the east and Saptagram, then known as Porto Pequeno or Little Haven in the west. The Tolly's Nallah or the Adi Ganga was then the outlet to the sea and ocean-going ships came up to around where Garden Reach presently is, for anchoring ships.

On the banks of the Adi Ganga, there are many temples, which are as revered as they were earlier, such as Kalighat, Tripureswari Temple of Boral, South Kolkata. The people of this area still burn their dead bodies on the bank of the ditch or the low-lying lands, which once called as the Adi Ganga and consider the water of as sacred as the Ganga.

Reasons behind drying up the river

Some quarters ascribe the virtual drying up of the Adi Ganga may be due to given importance to the lower channel of the Saraswati. To ease the upstream journey of the European merchant ships, the lower tract of the Saraswati was connected or and excavated the Ganga near Calcutta nearly three centuries ago ocean going ships abandoning the Adi Ganga. Others think that there was only a tidal creek connecting the Saraswati and the Hooghly, near the point where the Adi Ganga branched off. It is rumoured that the Dutch traders re-sectioned this tidal creek to let sea-going vessels come up the Bhagirathi.

Besides these, the neglect of waterways in general and other factors such as population pressure and unplanned urbanization caused further silting of the Adi Ganga. It ultimately turned into a sewer channel for the southwestern part of Kolkata.

Impact of the construction of the Kolkata Metro Rail

The Kolkata Metro Rail (underground railway system) stretching from Dum Dum to Tollygunge is an underground track, except the two terminal stations. A decision was taken to extend the southern end of the Metro by 8.5 km to Garia. The major difference for this extension is a totally over ground stretch running on an elevated track, quite contrary to the existing underground one. The Tollygunge-Garia section will run over the Adi Ganga. In 2007, the track work has completed and train started to ply. The railway track is laid over a row of concrete pillars on the bed of the Adi Ganga. Six out of the seven stations on this new stretch will be elevated stations. Social activists opine that Metro railway's construction activity will finally sound the death knell of the Adi Ganga.

Present condition of the course of the river

The river, which once had a number of bathing ghats, temples and sacred cremation grounds on its banks, has now turned into a stinking sewer and source of all kinds of water borne diseases. Unauthorized constructions have been built on both the

banks as the city spread southwards. A number of small factories and residences all dispose their waste of all kinds in to the channel. The waterway is already gasping for life with the human usurpation of its flowing course. At some places the course has totally dried up and some places, it is now transformed into rice fields, ponds or jhils.

For the families of South Kolkata, who immerse their idols in the Adi Ganga because of tradition, is now a headache. The Adi Ganga, which was a navigable river in past, now it becomes a canal of only 10 feet deep, and a 5 feet bed of alluvial. With immersions every year, the slit bed rises also.

Conclusion

The river shows many changes and now in a state of an ignominious death. It has a historical past linked with local culture and tradition. People still revere it as the original river. There is a strong community effort to rejuvenate the river. The Adi Ganga or Tolly's Nullah has recently become the focus of a number of community environmental initiatives. Therefore, it is now time to raise voice to save the remaining portion of the Adi Ganga. If the river can be rejuvenated with the Ganga water, this can save the river system of South Bengal also.

Bibliography

- Banerjee, Anuradha. 1998. Environment, Population and Human Settlement of Sunderban Delta.
- Banerjee, Himadri. Gupta, Nilanjana and Mukherjee, Sipra. 2009. Calcutta Mosaic: Essays and Interviews on the Minority Communities of Calcutta.
- Chakraborti, Dilip Kumar. 2001. Archaeological Geography of the Ganga Plain: The lower and the middle Ganga.
- Naskar, Kumudranjan. 1993. Plant wealth of the lower Ganga Delta: An Eco taxonomical approach.
- Parua, Pranab Kumar. 2010. The Ganga: Water use in the Indian Subcontinent.
- Roy, Samaren. 2005. Calcutta: Society and Change 1690- 1990.
- Stephen, S. Jeyaseela. 2008. The Indian Trade at the Asian frontier.
- 'Adi Ganga' derived from <http://lokkfolk.blogspot.in/2010/07/adi-ganga.html>, viewed on 12.06.2013.
- 'Kolkata metro extension project under scanner' derived from <http://www.downtoearth.org.in/node/8829>, viewed on 14.6.2013.
- 'South 24 Parganas - an overview' derived from <http://wbplan.gov.in/HumanDev/DHDR/24%20pgsSouth/Chapter%2001%20FINAL-1.pdf>, viewed on 14.6.2013.
- 'Settlement pattern of eastern Kolkata' derived from <http://rdarc.itakura.toyo.ac.jp/webdav/ask/public/ACP2010/2.pdf>, viewed on 16.6.2013.

Sridhara Temple, a lesser known Temple of Bishnupur: Need for Conservation

ISHANI CHATTERJEE

The state of West Bengal is enriched with varied heritage monuments spread over in different areas. Some of these monuments have gained the “*Protected*” status from the *Archaeological Survey of India (ASI)* whereas others lie neglected and even unnoticed. Bishnupur (lat. 23°45' N, long. 87°19' E) in the district of Bankura, West Bengal stands out for its diversified terracotta temples belonging to 15th to 18th century, built under the royal patronage of the Malia rulers. Of the diverse temple types in Bishnupur, *Sridhara temple* is the only “*Navaratna*” type, well adorned with rare terracotta ornamentations. But hardly do people know about it since it is not the so-called *Protected Monument* under the *Archaeological Survey of India* unlike the other terracotta temples of Bishnupur. Even the local people, when questioned, show surprising expressions about the temple's existence and whereabouts. In spite of its architectural and decorative significance, the *Sridhara* temple lies in an utter state of negligence. The present paper attempts to bring this *neglected temple* in limelight and ascertains the need for its immediate conservation.

Brief History of the Temple

The *Sridhara* Temple is located on the *Western* side of Madangopal Temple and *North* of Yamunabandh. It was built during the time of Bireswar Basu, a member of the local Basu family.

Salient Features as pointed out by Biswas: 1992 : 25 –

- (1) It is the only monument in Bishnupur which does not owe its origin to any person belonging to the Malla family.
- (2) Only example of *Nava-ratna* variety of temple at Bishnupur, i.e., there are 9 towers. There are two roofs, one having smaller dimension above the lower roof, each of which is fitted with 4 towers at 4 corners and one large tower at the centre on top.
- (3) The temple is almost square with each side measuring 5.3 m and height of 10.4 m and faces *East*.
- (4) It has four porches on four sides. There are three arches on each side facing *South*, *East* and *North*. The porch on *West* is like an open corridor.
- (5) The roof of the porches is vaulted, while the inner sanctum is topped by a roof.

- (6) Terracotta panels include scenes from the *Ramayana* and *Mahabharata* and *Krishnalila* episodes on *Eastern* side. Some panels show foreign soldiers holding guns as well as some musicians.

Material used in construction

Sridhara Temple is brick-built with terracotta carvings. Terracotta refers to all kinds of fired clay, which when fired assumes a colour ranging from dull ochre to red. Its durability makes it suitable for use in sculpture decorations over monuments and architectural purposes (Batra : 1996 : 158).

Whether temple is Abandoned / Worshipped

Temple is still worshipped every day.

Present Status of the Temple

Show signs of deterioration.

Every monument is prone to various agents of deterioration especially when it is located in a tropical country like India. Repeated field works undertaken by the researcher during different seasons of the year have revealed that the temple has already fallen prey to the various agents of deterioration leading to physical, chemical as well as biological damage.

Visible Damages to the Temple

(1) Physical Damage:

- (a) In the *Southern* portion, a new wall has been constructed as the old wall had fallen down. In the *Northern* portion, however, the wall retains its old character.
- (b) In the year 2011, due to a severe thunderstorm, one of the four towers on the upper smaller roof on the *North-Eastern* side had collapsed. It was repaired after almost one and half years.
- (c) Human vandalism : Many terracotta panels have been removed from their original positions and scrapped off.

(2) Biological Damage:

Growth of vegetation and biocolonization is prominent in some of the terracotta plaques, mostly on *Eastern* and *Northern* sides.

- (a) Most of the temple surfaces show prominent *black patches* on upper and lower surfaces of the eastern and western walls, upper surface of the roof, basal plinth and the towers of the temple. During early June, the patches appear *black* and same patches appear *green* in monsoon. Colonisation of Cyanophyta / blue-green algae is observed. Cyanobacteria are responsible for forming a solid blackish-brown crust. The slimy surface

of these bacteria facilitate the adherence of airborne particles of dust, pollen, oil and coal ash giving rise to hard crusts, that are difficult to remove (Kumar. *et al*: 1999:14).

- (b) *Greenish-white* circular patches are noted on the *Northern* wall of the temple and on basal terracotta panels. During summer, these appear as whitish patch, but with onset of monsoon, they turn greenish-white due to *formation of Crustose Lichens*. They grow as crust in strong attachment with the surface. They bring about biophysical deterioration through penetration of the attachment devices of the thallus into cracks and pores of the bricks, which may further widen by increase in mass of the thallus.
- (c) Greenish mat is found on the terracotta plaques on *Northern* side, base of terracotta plaques on the Eastern sides and on towers due to growth of moss. They frequently occur in association with algae only where excessive damp condition prevails and there occurs humus deposits, resulting from accumulation of dead algae. Their growth is an indicator of excess humidity.
- (d) Emergence of leafy plants at the cracks and crevices of terracotta panels on towers and lower part of the roof on eastern side is observed. The uppermost tower as well as base of temple show prominent vegetative growth of the peepal trees. They bring about biophysical decay which is mainly due to growth and radial thickening of the roots of plants inside the substrate, causing increased pressure in the surrounding masonry.
- (e) Chipping off terracotta at many places on *Eastern* side of the temple. Decorative terracotta panels were fixed with lime-mortar on external surfaces. This lime mortar turns to powder with the passage of time, water gets access in between brick wall and terracotta panels, causing the decorative panels to come out of their original position. Biocolonization may have led to formation of powder. Greenish layer of biocolonization is visible in the areas where chipping has occurred.
- (f) Excretory deposits on surfaces of inner walls and towers of the temple as bats inhabit.

(3) Accumulation of salt on a some terracotta panels:

It is evident from the above observation that among the other deteriorating factors affecting the *Sridhara Temple*, Bio-colonization is the most prominent. Biological colonization refers to the colonization of a substrate (stone, brick, etc.) by biological organisms either lower groups like bacteria, cyanobacteria, algae, fungi and lichen (symbiosis of the latter three) or higher groups of plants as well as influences by other organisms, such as animals nesting on and in the surfaces. In the tropics, high humidity and sunshine encourage

these biological growths (Garg *et al.* 1994 : 147). In fact, bio-colonization forms a source for all other deteriorating factors excepting human vandalism.

Long-term Effects of Bio-colonization on the Temple

- (1) **Biophysical deterioration:** Occur due to pressure exerted on surrounding surface during growth or movement of an organism or its parts (hyphae / rhizhines / extensive root systems). The substrate then becomes more susceptible to other deterioration factors, i.e. biochemical.
- (2) **Biochemical deterioration:** Results from assimilatory processes of the biological organisms. Autotrophic organisms and heterotrophic organisms produce organic acids. These acids on reaction with the substrate may produce salts and chelates, causing stresses in pores, leading to formation of cracks. Insoluble salts and chelates form crusts on the substrates.
- (3) **Aesthetic Deterioration:** Bio-colonization alters the appearance of the terracotta substrates due to chromatic alterations and formation of biological patinas. With passage of time, this aesthetic biodeterioration may lead to physiochemical damage.

Thus the entire process of biocolonization involves the interaction of micro-organisms, plants and animals, each of which are interlinked through their physiological functions. The development of any entity will inevitably accelerate the development of the other.

Such is the status of the *Sridhara* Temple of Bishnupur till now. Field observations reveal how this temple is slowly getting subjected to the various deteriorating agents, especially biodeteriogens. Until and unless the deteriorating factors are brought into control, the combining effects of all the deteriorating agents will indeed lead to the loss of original ornamentations of this “*unprotected temple*”. Till now, two to three publications mention about this temple, that too very briefly. It is high time that any Government or Private organization dealing with conservation issues look into the matter and give the necessary protection to this *great reminiscence of architectural beauty* to prevent its eventual deterioration. The local people of Bishnupur also need to be sensitized on the significance of this temple so that they too come forward and assist in future preservation of the monument. With little care, awareness and conservation approaches, *Sridhara* temple – the only *Navaratna* temple can regain its originality and get entry into the known *Heritage* grandeur of Bishnupur.

The author had a chance encounter with one of the inheritors of the Basu family during her field visit and was grateful to him for providing some authentic information about Sridhara Temple.

Reference

- Batra, N.L., 1996. Heritage Conservation: Preservation and Restoration of Monuments, Aryan Books International, New Delhi.
- Biswas, S.S. (1992), *Bishnupur*, Director General, Archaeological Survey of India, New Delhi.
- Garg, K.L., Garg, N. & Mukerji, K.G. 1994. *Algae as Biodeteriogens in the Tropics*, Recent Advances in Biodeterioration and Biodegradation, Naya Prokash, Kolkata, p.p. 146-152.
- Kumar, R. & Kumar, A.V 1999. Biodeterioration of Stone in Tropical Environment- An Overview, J.Paul Getty Trust.

Urasgattas of Chhattisgarh : an Ethno-Archaeological and Artistic overview

KEKA ADHIKARI (BANERJEE)

'Urasgattas' – wooden pillars in memory of dead by the Dandami Marias are enigmatic item in the archaeology and art historical writings of Chhattisgarh as well as have a broader perspective in comparison to wooden memorials of other tribes which demand better preservation for further researches on their ethno archeology and artistic appreciation in a holistic manner.

The state of Chhattisgarh has a rich history of deeply rooted culture, traditions and special features which can be traced back to the *purāṇic* age.¹ In the year 2000 it has become a new state bifurcating from old Madhya Pradesh and the population of tribals has also been bifurcated to a great extent. One third of its population is tribal² (as per 2001 census 34% tribal population) and they are extended widely. Their isolation and lack of communication from the modern world helps to retain their own culture & customs. Among these tribal people the practice of erecting memorial pillars in memory of the deceased are common and such pillars are made of wood which are known as 'Ususkals' or 'Urasgatta' post. A pillar as a part of sepulchral mound is known as 'Yasṭi' in Sanskrit and 'Iasṭi' in Prakrit. Such pillars are found from the excavation at Kausambi (circa 5th century B.C.), Sui Vihar inscription of 1st century A.D. (now preserved in the Asiatic Society Museum) mentions the erection of a 'Yasṭi' as a memorial pillar, wooden post of Lauriya Nandangarh and memorial pillars called *cāyāstambhas* at Nagarjunikonda indicate that the people were accustomed with the practice of erecting such memorials.³ Chhattisgarh is not an exception of it as the earliest reference of a wooden pillar is found from Kirari, in the Bilaspur district (16 km. west from Chandrapur) and this pillar contains an inscription similar to the character of the letters resemble to Nasik inscription. Hirananda Sastri has opined that this pillar may be related to any *Vājapeya Jajña* or to commemorate any success.⁴ So erecting a memorial either religious or secular for paying homage to the departed soul and also in memory of the people who laid down their life for the sake of their society was a common practice from the Vedic period and till date it is a living tradition. *Śatapatha Brāhmaṇa* has mentioned two types of sepulchral mound i.e. quadrangular mound over the

dead who follows the Vedas and circular mound of the non-Aryans which obviously corresponds to the megalithic monument representing secular architecture. But no mention of pillars erected as a part of sepulchral mound is found in the Vedic texts.⁵

Bastar, Dantewada and Kanker districts in southern part of Chhattisgarh are not only well-known for its own cultural identity but also unique & distinctive through the remains of its archaeological treasures available in the form of memorials and their relationship with the tribal culture consisting the belief, customs, laws and man-nature relationship which may be termed as social heritage. In other parts of the state memorials are mainly found in the form of temples, hero-stones and sati-pillars.

Gamewada containing a number of megalithic burials about 85 kilometers from Jagdalpur and approximately 10 Kms. ahead of Dantewada] covering an area of one acre, datable to 3rd-4th century A.D. traces a typology of their own as used by the megalith builders of this region. The site was brought under the protection by 'the Ancient and Historical Monuments and Archaeological Sites and Remains Amendment Act', 1953/No.3 dated 2nd January, 1954. Though stone circles have been reported from other sites of Chhattisgarh like Seoni, Raipur, Bilaspur, Durg, yet in Bastar menhirs are found in an alignment. Bartiya Bhata is another site in Durg district where the menhirs are in alignment and also in scattered manner. There is no clear picture about the life ways of such megalith-builders (further excavations can throw light in future) but it can be assumed that the people generally occupied the hilly areas where raw materials in the form of granite, sandstone etc. were near their hand. We will not discuss the megalithism of ancient period in detail but what is interesting to note that till date erection of such stone or wooden menhirs by the living communities, particularly the Bhils, Korkus, Murias, Kuruks & Gond tribes inhabiting in Bastar region are profusely found. Sometimes, these wooden memorials are erected in association with stone menhirs or sometimes independently. The question is whether here megalithism is a living tradition or not? As there is a first process of urbanization and industrialization through deforestation gradually changes are noticed in the cultural and biological characteristics of the aborigines. Though the case may be observed through the ritual and funerary practices of the tribal people yet the study should be based on materialistic remains using ethnographic data from the living communities in an accumulative manner which include physical characteristics of the tribal group including their mortuary practices, technological and material traits and their economic levels. How far the past cultural traits are surviving and how much primitive are they that is also to be taken into consideration. The main focus of this article will be on the wooden memorials – their builders, social and ritualistic concept behind it and the artistic excellency expressed through these memorials.

The whole tract of Bastar plateau has an undulated topography having a number of well-marked elevations and depressions.⁶ It is a hilly and forested tract to a greater extent and slowly descends to the various river plains of the Deccan table land.⁷ Abujhamar hills occupies western part of the district, the height of which ranges between 600 mts.-800 mts.⁸ Due to its physical barrier the region is isolated and inhabited by the tribal folk having their separate identity, culture, custom, art, values which are nurtured by the nature only. Even this hilly, forested, semi arid abode supports the tribal inhabitants to be primitive and dependable on nature. The tribes are distributed over a large tract for which they face communication problems and in the long run the sub-sects of the same tribe in association of other tribes become familiar in other names. Also changes in their culture and custom can also be noticed. Muria, Maria, Bhatra, Halba, Dorla, Dhurwa, Korkus etc. are the main tribes of Bastar-Dantewada region.

Among them Marias erect memorials which are known as 'Honal Gatha'⁹ in memory of an outstanding personality or deceased persons. Marias who are the subtribes of Gonds have several sub classes (1) Abujh Maria or hill Maria; who used to live in the north-western part of the district, known as Abujhmarh. The other classes are known as *Dandami Maria or Bison-horn-Maria* (by Grigson, 1938, reprinted 1991) and they are extensively distributed in Southern Bastar among the entrancing hills of Dantewada, in the dry forests of Bijapur, among the hot but lovely low lands of Konta, in the remote Sukma or Kutru Zamindaries.¹⁰ They are distinguished from other aboriginals by their splendid head dress like bison-horns and dancing sticks. Marias – 'man of wood' are strong in their physical character, finely featured and are lovely golden-brown in colour.¹¹ Both of these *Marias* are very primitive, isolated and still now practicing traditional way of life and rituals.¹²

Though the Murias of Bastar erect wooden pillars in memory of some personalities, Kurkus of Indravati Valley erect such pillars with the carvings of bird at the top, yet the Bison-horn Maria adopt this practice widely and these are found from the highway from Jagdalpur to Geedam, Kirandule, Dantewada, Barsur and Bijapur.

Wood as a plastic material has been of extensive use for at least 5000 years,¹³ and its popularity increased due to its easy tractability and availability. As the Maria tribes used to live in hilly and densely forested land, so they selected wood as their medium of erecting memorial pillars. They mainly used *Terminalia tomentosa* or saja wood and *Shorea robusta* wood sacred to them. These pillars are known as 'Urasgatta' obviously derived from the 'Urasna' meaning 'to bury' and 'gatta' – a pillar.¹⁴ Though Grigson has called these as Urasgatta posts yet the local Marias called these as '*Khambas*', possibly due to the assimilation of urban Hindi speaking people and I have seen number of '*Khambas*' - wooden pillars in between ponds [possibly due to commemorate the digging of that particular pond].

The Abujhmarias bury their dead and place a stone menhir which are locally known as *mangrahal*.¹⁵ But the Bison-horn Marias perform *talapaintened* ritual on the fourth day and *uskaned* ritual¹⁶ in which they erect menhirs either in stone or wood in memory and for the appeasement of the dead.¹⁷ The erection ceremony of such *Urasgatta* is quite elaborate and almost same to those for a stone.¹⁸ A large feast to relatives & friends is given in this ceremony. Even they offer grave pots with liquors in memory of the deceased and to avoid any harm by the angry ghosts. These *urasgattas* are the solid columnar poles, about 3 meter tall and 75 meter thick¹⁹ and reveals an attempt to be a biography of the dead. Sometimes, these are either illustrated with paintings and wood carvings or non-illustrated and very simple in nature. Possibly it depends on their socio-economic condition, the rich & wealthy people erect these in more illustrated manner in memory of important, renowned personalities of their family.

Verrier Elwin who has elaborately worked on the *Marias*, has commented in his book titled 'Tribal Art of Middle India' – that the pillars were not carved by the Maria people but by the carpenters or skilled tribal wood carvers who have to follow the instructions of the Marias for which their tastes and figures have reflected on these pillars. Elwin has also given an example of erecting a wooden memorial for Barse Marka which took fifteen days when the cost was not so high. But due to higher cost of wood and inaccessibility of it from the forest the practice of erecting such pillars is decreasing. Another great factor for decreasing the practice is the deteriorating characteristics of wood buried under soil due to weather, termite & attack of micro organism. Moreover, these pillars remain uncared for several years after its erection. Belief of the *Marias* is that with the deterioration of the pillars the soul of the persons in whose memory it was erected is freed and the moto is fulfilled and ultimately it reaches heaven with the complete decadence of it.²⁰

In spite of decadence the existing wooden memorials show beautiful carvings, paintings illustrating various activities of the dead persons, wealth & power on riding a horse or elephant,²¹ their favourite animals, weapons, trees and various motifs which slightly vary from one to another. These wooden pillars are either rectangular or cylindrical having dome shaped top with various motifs. One interesting wooden pillar having the motifs of bison-horn is found on the way to Geedam. Besides a number of such pillars are found on the way to Dantewada and Chitorkot falls. These pillars are sometimes divided into panels and in most of the cases birds, fishes, crocodiles and other reptiles etc. made of wood are fixed at their tops. Each and every part of the wooden pillars are carved with animals, fishes, pigeons, birds, trees etc. There are no symmetry in carving such figures, perhaps only moto was to filling up the space. Even the decorations vary from one area to another which shows transmission and oscillation of culture & tastes of other tribes. Verrier Elwin has recorded some examples of such pillars and their

carvings. One such pillar is found near Dhilmil, 35 Kilometers from Jagdalpur and stands on the right side of the road. The place falls within the jurisdiction of the Revenue Circle – Tokapal, Sub Division-Tahsil, Jagdalpur and Police Station – Kodenar. This is heavily ornamented with many figures with the central figure on elephant and he is given rice-beer in landa pot. These urasgattas are also known as Kama Memorial and protected by the Archaeological Survey of India. Other mentionable pillars at Messenar in memory of Kopa Dhurwa, Marvi Masa or pillars at Bare Arapur and Chingner show more or less same variety. A pillar in memory of *Marvi Masa*, homicide is carved in rather simple manner. Masa is carved as sitting on his swing on all four sides. He holds sword, sacrificial spoon and trident on its head are carved.²² During my visit at Bastar, Dantewada, Barsur, Bijapur I have found some urasgattas which also show either man riding on elephant with axe and dagger, small panels are filled with reptiles like crab, dinosaur(?) / crocodile like figure, or dancing men & women in colourful dresses in painting to give pleasure to the dead person and the name of the deceased is written. In one pillar the finial is carved in bison-horn shape and others are simply carved in rows of lozenges with pigeon finial (as in Chingner, Bastar, Sketch 1). One beautifully painted and carved wooden memorial is preserved in the Anthropological gallery of Mahant Ghasidas Smarak Sangrahalaya, Raipur where colourful paintings of men & women, animals are found and at the top colourful birds carved out of wood are fixed. Another simply carved wooden memorial is also displayed here. Maria pillars are usually coloured in red & blue first and possibly with the white background.²³ Though the paintings are done in yellow, red & blue colours. A very good specimen is preserved by the Anthropological Survey of India in their museum at Jagdalpur.

Maria pillars remind us about the Hindu custom of erecting wooden memorials named as '*Vṛṣākaṣṭha*' with a *Siva* phallus at the top, bull and male and female figures at the bottom.²⁴ These bull posts or *Vṛṣākaṣṭha* show the posts transformed into a general likeness of the deceased. They are set up near a pond and are left uncared for after its erection²⁵ possibly with the same aim of the *Maria* tribes. *Marias* employ carpenters belonging to the lower Hindu cast to make such pillars as per their direction and desire which show an expression of Maria sensibility.²⁶ Elwin has opined that these "Maria memorials are adaptations from Hindu models which have since disappeared. But in considering the life & culture of the modern Indian aboriginal too sharp a line cannot be drawn between him and his Hindu neighbour. His religion is a member of the Hindu family; many of his social customs are the same or similar; his art cannot fail to be influenced by the prevailing culture of the country."²⁷ Even the *Korku* tribes of Panchmarhi region erect memorials which resemble same facts and carvings like the *Marias*. But unlike to them *Korkus* prefer the carving of the deceased on the horse back with weapons in hand and sun & moon above. Likewise the *Bhil* '*gata*' resemble same carvings but they are mainly

made of stone and are erected only in memory of the important persons.²⁸

We may conclude with the comments of K. K. Dasgupta which helps us to guess it properly "In true sense these art activities are not the great works of art and nor they claim to be so, but it is beyond doubt that they have separate identity in respect of their beauty along with elemental vitality. Stemming from and belonging to an emotional heritage, without the bounds of any time and space, they are absolutely valid in their visual appearance and their appeal, regardless to their contexts and meanings is to our basic aesthetic impulse".²⁹

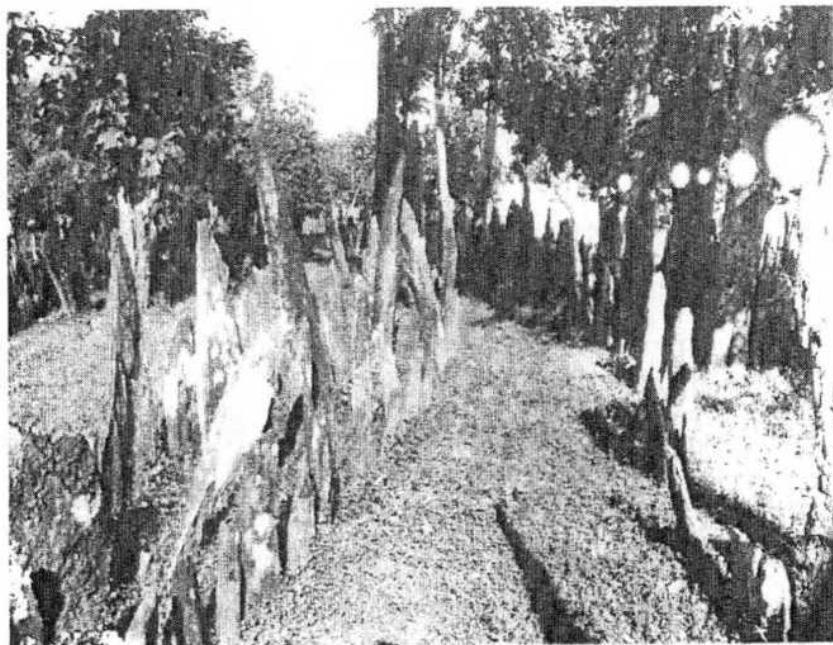
References:

1. S. H. Ahmad ; "An Anthropometric Study of four Tribes of Chhattisgarh" in Chhattisgarh : An Area Study, ed. by Ajit Kr. Danda, Calcutta, 1977, P-7.
2. Ibid ; P - 7.
3. K. Rajan "Memorial Stones in Tamil Nadu" in New Trends in Indian Art and Archaeology. (S. R. Rao's 70th Birthday Felicitation Volume), ed. by B. U. Nayak, N. C. Ghosh. Vol. I. PP-251-252.
4. Jain Balachandra ; Utkirna Lekh (in Hindi); Raipur, 2005, P - 1-2.
5. K. Rajan ; "Memorial Stones in Tamil Nadu" in New Trends in Indian Art and Archaeology. (S. R. Rao's 70th Birthday Felicitation Volume), ed. by B. U. Nayak, N. C. Ghosh. Vol. I. P-251.
6. Malati Mahajan ; Chhattisgarh : A study in the culture & historical geography (From place names in inscriptions), Delhi, 2000, P-3.
7. Amitabha Sarkar & Samira Das-gupta ; Spectrum of Tribal Bastar, Delhi, 1996, P - 15.
8. Malati Mahajan ; Chhattisgarh : A study in the culture & historical geography (From place names in inscriptions), Delhi, 2000, P-3.
9. K. L. Kamat ; Wooden Memorials of Madhya Pradesh (First on line : October 16, 2000)
10. Verrier Elwin ; Maria Murder and Suicide, Oxford University Press, Calcutta, Delhi, Madras, 1966 (reprinted in 1977), P - 11
11. Ibid ; P - 11
12. Amitabha Sarkar & Samira Das-gupta ; Spectrum of Tribal Bastar, Delhi, 1996, P - 25
13. K. K. Dasgupta ; Wood Carvings of Eastern India, Calcutta, P - 4
14. Verrier Elwin ; Maria Murder and Suicide, Oxford University Press, Calcutta, Delhi, Madras, 1966 (reprinted in 1977), P - 32
15. Amitabha Sarkar & Samira Das-gupta ; Spectrum of Tribal Bastar, Delhi, 1996, P - 23
16. Ibid ; P - 37
17. Verrier Elwin ; Maria Murder and Suicide, Oxford University Press, Calcutta, Delhi, Madras, 1966 (reprinted in 1977), P - 30
18. Shah Shampa (ed.) ; Tribal Arts & Crafts of Madhya Pradesh, Bhopal, 1996, P - 56
19. Ibid ; P - 56

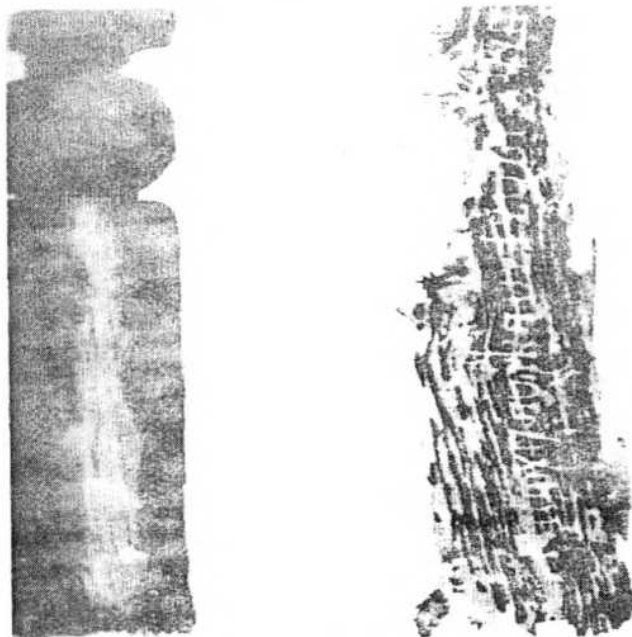
20. Ibid ; P – 56
21. Ibid ; P – 56
22. Verrier Elwin ; The Tribal Art of Middle India (a personal record by Verrier Elwin), Oxford University Press, 1949, P – 92-93
23. Ibid ; P – 91
24. Ibid ; P – 94
25. Barbara Stoler Miller (ed.) ; Exploring India's Sacred Art (selected writings of Stella Kramrisch), Delhi, 1994, P – 103
26. Verrier Elwin ; The Tribal Art of Middle India (a personal record by Verrier Elwin), Oxford University Press, 1949, P – 3
27. Ibid ; P – 94
28. Ibid ; P – 90-91
29. K. K. Dasgupta ; Wood Carvings of En India, Calcutta, P – 27

Select Bibliography :

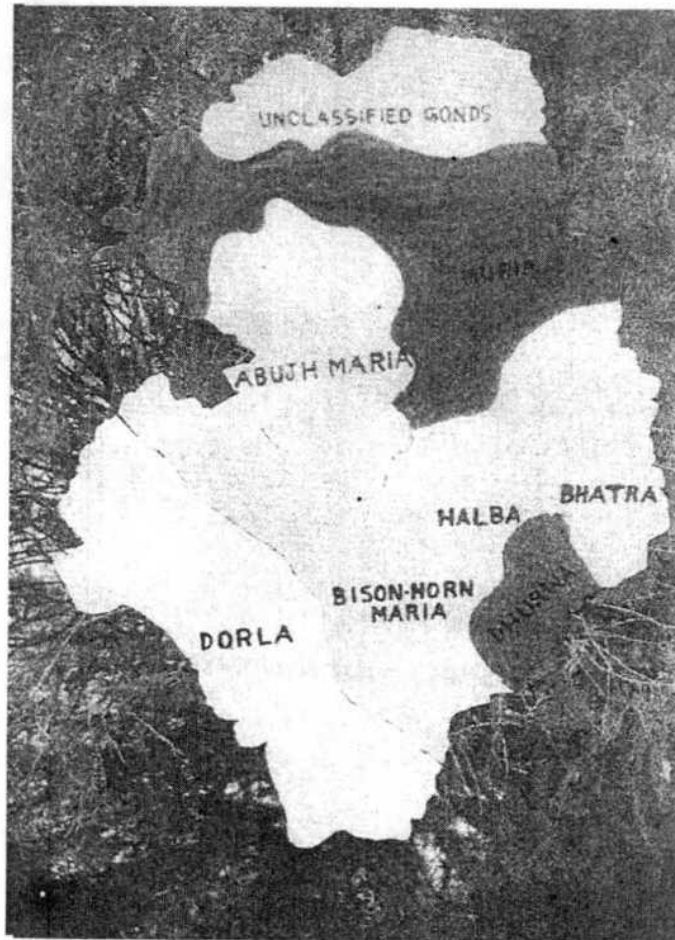
1. L. P. Vidyarthi & B. K. Rai ; The Tribal Culture of India, Delhi, 1977.
2. N. P. Srivastava ; Marla Lok-katha (In Hindi), Anthropological Survey of India, Calcutta, 1979.
3. Stephen Fuchs ; The Korkus of the Vindhya Hills, New Delhi, 1988
4. Tarapada Santra ; Banglar Kather Kaj (in Bengali), Calcutta, 2003
5. Archaeological Survey of India Report, 1967-68



Megalithic Memorials at Bastar

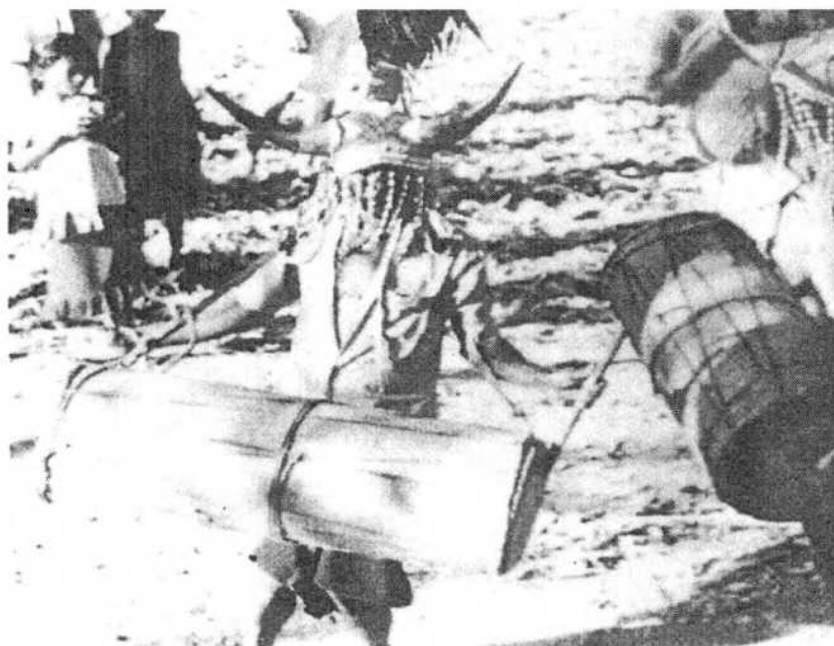


Kirari Wooden Pillar Inscription (2nd Century A.D.)



Distribution of Tribal Population at Bastar

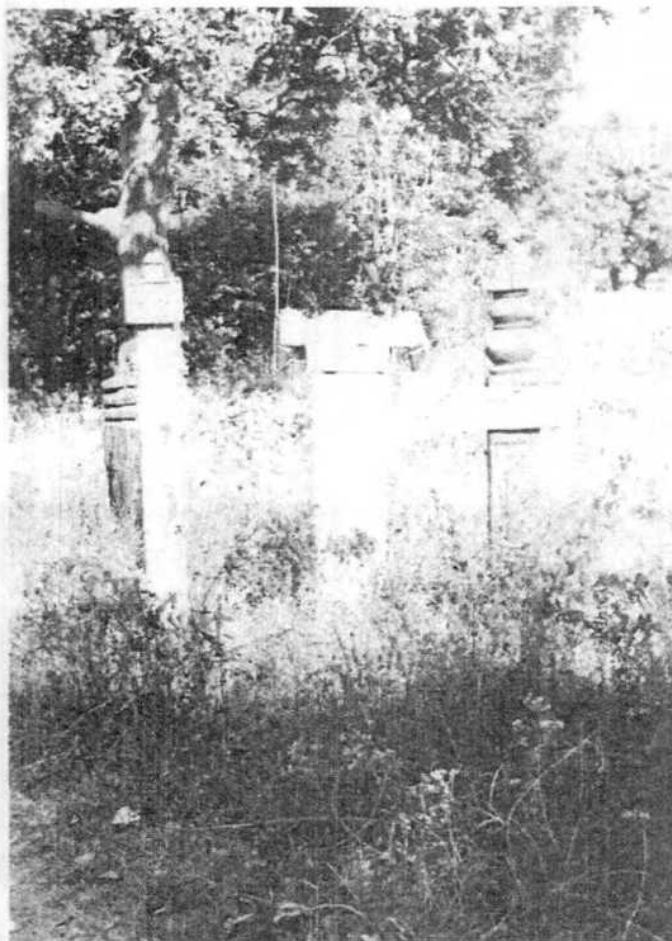
*Courtesy : Spectrum of Tribal Bastar by Amitava Sarkar
and Samira Dasgupta*



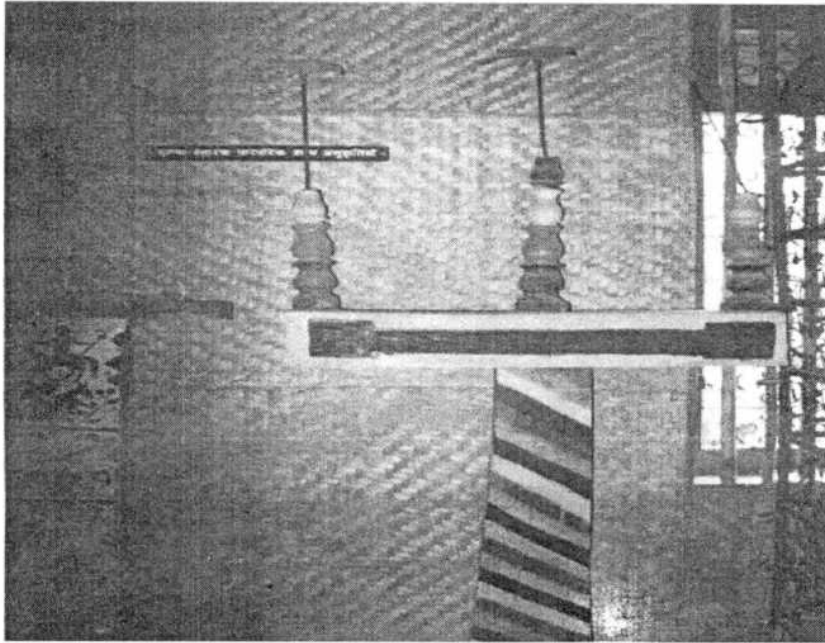
Maria Dance with Traditional Bison Horn Head Gear



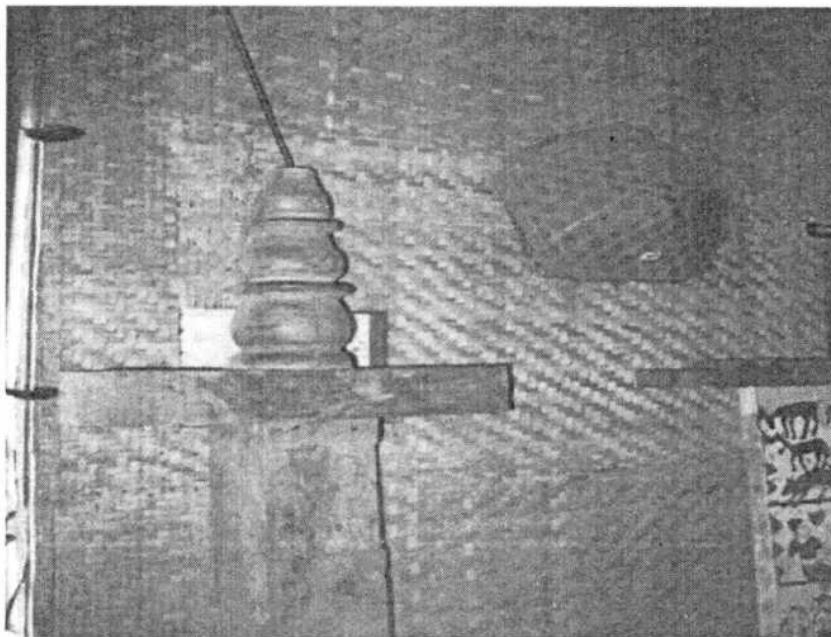
Wooden Memorial on The Way to Dantewada



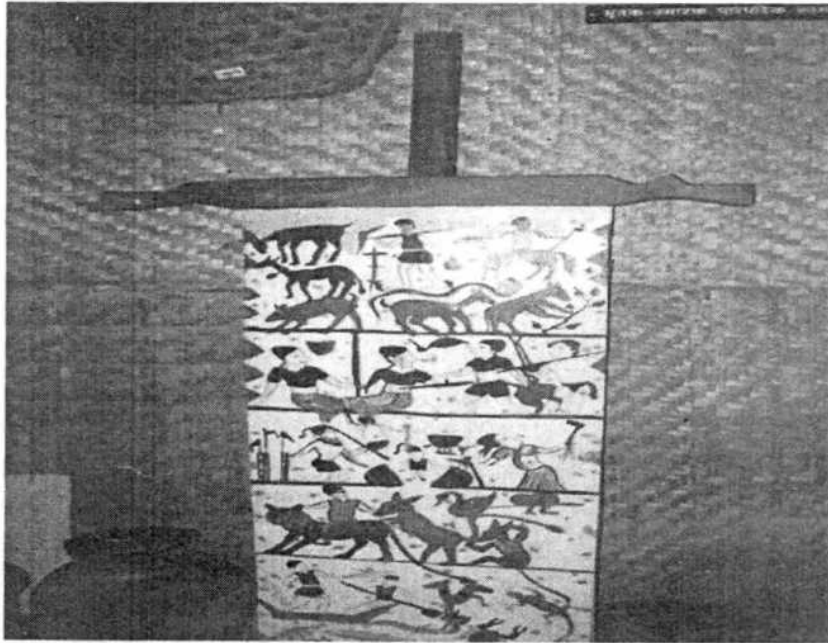
Cluster of Wooden Memorials on The Way to Geedam



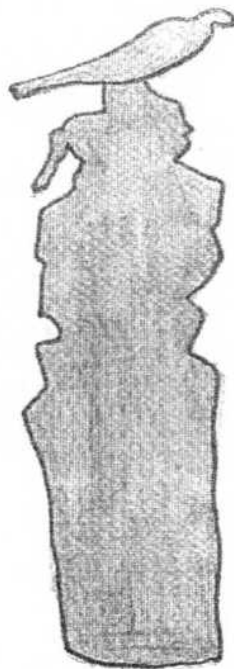
Wooden Memorials Preserved in The Raipur Museum



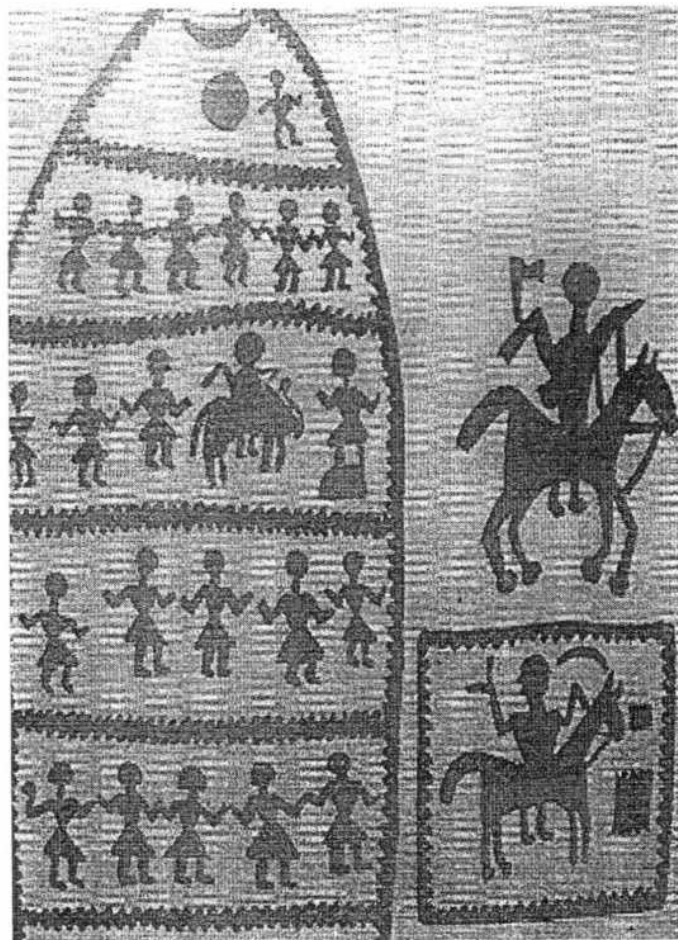
Wooden Memorials Preserved in The Raipur Museum



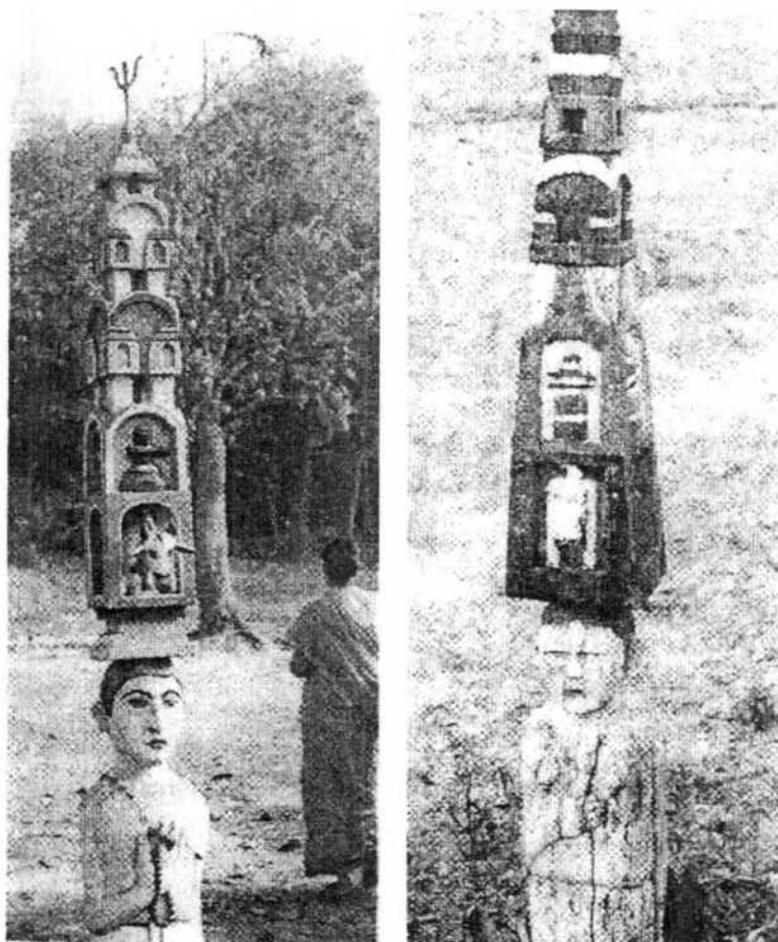
Wooden Memorials Preserved in The Raipur Museum



Line Drawing of Chingner Pillar, Bastar (after verrier Elwin)



Wooden Memorial of The Bhil Tribes



Bull Post, Bengal

Courtesy : Banglar Kather Kaj (in Bengali) by Tarapada Santra

Auspicious Symbols in Early Mediaeval Stone Slab Inscriptions of Karnataka

SUDIPA RAY BANDYOPADHYAY

The practice of embellishing inscriptions with various kinds of floral, vegetal, and geometric designs existed in India from very ancient times. These ornamentations gradually came to be accompanied by motifs of a more symbolic nature in course of time. Symbols depicted in early Indian inscriptions can be broadly divided into four groups: (a) Taurine and double-limbed symbols, (b) Triskelion and *triratna*, (c) Varieties of triangles, circles and semi-circles, and (d) *Svastika*. Other symbols like tree within railing, hill surmounted by crescent, structural representations, water-vessels, *sankha*, *chakra*, star, crisscross design, cross and vertical lines, etc. can also be found in early Indian inscriptions. These symbolic representations were meant to act as marks of auspiciousness.

Besides these symbolic representations, theriomorphic and anthropomorphic figures executed partially or in full can also be found in early Indian inscriptions. Stylistically speaking, the figures appearing in the inscriptions are either incised or sculpted. Sometimes inscriptions are accompanied by some unobserved artistic motifs which provide significant insights into the existing society and its values. Here I will discuss only some auspicious symbols depicted in early Indian inscriptions of the 11th and 12th centuries CE from Karnataka region.

The most commonly found auspicious symbols are **Sivalinga and Bull; Sun and Moon**; and **Cow and Calf**. The benedictory nature of the *Sivalinga* and bull motifs is self-evident owing to their religious association. Siva is the protector against violation of the grant on the spiritual side. The sun and the moon indicate that the grant is to last as long as these luminaries endure. The cow and its suckling calf symbolize fecundity: the cow is intended to represent land, the milk the produce of the land, and the calf the enjoyer.

Auspicious Symbols



Suckling Calf



Cow and Calf



Sun & Moon, Siva-linga,
Cow and Calf



Workshipping Siva-Linga



Seated Bull



Sun and Moon

Benedictory motifs appear abundantly in inscriptions from Karnataka. Owing to their auspiciousness many benedictory motifs acquired a distinctly religious character in course of time. They are often seen appearing with divine and semi-divine figures in the inscriptions. During my field study of the sculptural art of temples in Karnataka, I came across a large number of such motifs in stone slab inscriptions within temple complexes of Jaina, Vaishnava, and Saiva religions. Here I would like to mention a few of them :

A ruined Jaina site at Arthipur, Mandya District, Karnataka

At the centre of the upper part of an inscribed stone slab there is a figure of a seated Jina. At his left there is a suckling calf and a lamp at his right. At the end of the slab, just beside the lamp, there appears a sun and moon motif (*Plate: 1 & 1a*).

Shantinatha Basadi at Jinanathapura, Hassan District, Karnataka

An elephant holding a bunch of flowers in its trunk is shown on the right side of the Jain Tirthankara, Parsvanatha. He, along with two male attendants, is seated under a highly decorated stele. On the left side appears a suckling calf. This is the most common auspicious symbol appearing in inscriptions of various religious affiliations. Near the stele appears the benedictory motif of the sun and moon. The entire plaque is decorated with a highly ornamented creeper motif. A *kirttimukha* figure with bulging eyes appears at the centre. The slab takes on the appearance of a *torana* bearing motifs of a pair of peacocks and one set of five *amraguccha* and one set of seven *amraguccha*. The *amraguchhas* are connected with the sun and moon motif at either ends, which is finally tied up with the *kirttimukha* at the centre (*Plate: 2*).

Keshava temple at Somanathapur, Mysore district, Karnataka

The highly decorated panel of this inscribed stone slab bears figures of Venugopala, Kesava, and Janardana along with their mount Garuda at the right corner. All the three deities have two attendants each. Above these three Vishnu images and Garuda, there is the figure of a *kirttimukha* at the centre of the slab. One is here reminded of contemporary Pala-Sena sculptural art of Bengal and Bihar where such representations of *kirttimukha* motif appear in large numbers. In between the

three images, the artist has accommodated the sun and moon motif without disturbing their compositional aspect. At the left corner can be seen the cow and calf, one of the most common benedictory motifs in inscriptions (*Plate: 3*).

Mallikarjuna temple at Basral, Mysore District, Karnataka

A bull is seated at the right side of the plaque and two devotees are worshipping a *Sivalinga*. Beside them, on the left, appears a cow and calf motif. The entire panel is surmounted by a *kirttimukha* figure with bulging eyes, similar to the relief of the slab of Jain Basadi. Here too can be seen the most ubiquitous auspicious symbol in inscriptions, the sun and moon (*Plate: 4*).

A Sadasiva temple at Shanthigram, Hassan District, Karnataka

In this relief, two priests are seen engaged in worshipping a *Sivalinga*. One is trumpeting a musical instrument and the other is holding a *ghanta* in his left hand and a *chamara* in the right. In addition, there are depictions of a lamp and a *chamara* on the plaque. Siva's mount, the bull is seated in front of the *linga*. The most common benedictory motifs of sun and moon and cow and calf are also seen in this plaque.

Buchesvara temple at Koravangala, Hassan District, Karnataka

Here the *rudra-bhaga* of a *Sivalinga* is covered with garlands of *rudraksha* and an ascetic is worshipping a *Sivalinga* using a bell and a *damaru*. His hair is matted and a *danda* and *kamandalu* is slung over his shoulder. Here also a suckling calf and sun and moon motif is depicted prominently (*Plate: 5*).

Chandramaulisvara temple at Arasikere, Hassan District, Karnataka

In the courtyard of the Chandramaulisvara temple there are a good number of stone slab inscriptions bearing several types of sculptural art. Out of these, four are representative examples. Two are of Saivite inspiration and two of Jaina. In the semi-circular portion of the slab of one of them there is an image of a seated Jina with his two attendants. It also bears motifs of sun and moon, suckling calf, dagger, and an elephant holding something in its trunk. The presence of the dagger motif suggests that the inscription has royal association. In another slab a Jaina deity is seen standing within a profusely ornamented temple-like edifice with two worshippers. In the other two inscribed slabs we can see ascetics worshipping a *Sivalinga*. There are also figures of a bull and suckling calf in both of them. One of them bears an *amraguccha* motif in between the representation of sun and moon (*Plate: 6*).

Lakshmi-Narasimha temple at Nuggehalli, Hassan District, Karnataka

A four-armed divine figure is seated in *dhyanamudra* along with two female attendants seated in a similar posture. Here the slab bears only one benedictory symbol – the sun and moon motif and it appears prominently at the top of the stele.

Benedictory verses and scenes appear abundantly in metal and stone inscriptions in various parts of India. In course of time most religions gave a scriptural sanction to these art motifs, and this came to be reflected in the beliefs and faiths of the common people. It can be assumed that all the religions prevalent in Karnataka in early mediaeval period made auspicious symbols a part of their religion and religious practices.

List of Illustrations

- Plate: 1* Ruin of a Jain Basadi , Arthipur, Mysore District, Karnataka [Photograph: Author]
- Plate: 1a* Close up view of a stone slab in situ, Jain Basadi, Arthipur, Mysore District, Karnataka [Photograph: Author]
- Plate: 2* Shantinatha Basadi at Jinanathapura, Hassan District, Karnataka [Photograph: Author]
- Plate: 3* Keshava temple at Somanathapur, Mysore district, Karnataka [Photograph: Author]
- Plate: 4* Mallikarjuna temple at Basral, Hassan district, Karnataka [Photograph: Author]
- Plate: 5* Buchesvara temple at Koravangala, Mysore district, Karnataka [Photograph: Author].
- Plate: 6* Stone slabs kept at Chandramaulisvara temple complex, Arasikere, Hassan District, Karnataka [Photograph: Author]

The Naga in the Art of Bharhut

SHREYASHI CHAUDHURI

Introduction

Indian art not only documents the history of a magnificent civilization but also opens a fascinating window into the timeless realm of the Indian spirit with the depiction in poignant visual forms of the essence of India's message for humanity (Zimmer, 2001). Indian art also mirrors the diverse socio-religious traditions of India which are nourished by a rich storehouse of myths and beliefs that perceive the natural world as a transcendent reflection of the spiritual realm. Myriad plants and animals appear in the different traditions of Indian art with a plethora of symbolisms (Chandra, 1996). If not the oldest, the serpent is at least among the earliest mythological symbols whose worship may have originated in fear but soon passed to the opposite extreme as the harbinger of health and prosperity (Fergusson, 2004). The serpent in Indian art is not any snake but the hooded Indian cobra (*Naja naja*) that was raised in the folklore to the rank of a divine being (Ghosh, 1978). This serpent, as well as the spirit representing its vital force, is generally called the *naga* (and the female *nagi* or *nagini*) in Sanskrit and Pali. Zimmer (2001) points it out that that Hindu, Jain and Buddhist depictions of the *naga* do not differ much, pointing at their cultural unity.

The Naga in the Culture of India

Ophiolatry is an ancient belief that is still practiced in India. Although the prehistoric *naga* cults are widespread, the medieval *nagi* cults are limited to eastern India (Fergusson, 2004). The *naga* cults are the dominant belief system in the Western Himalayas (Handa, 2004). The *naga-panchami* festival in the monsoon honours the *naga-devata* to ward-off snakes forced out of their holes into human dwellings. The serpent is worshipped as Naga-Raja. In eastern India, the *nagi* Manasa, and in southern India, the *nagis* Naga-Yaksi, Naga-Kanyaka and Naga-Camundi (along with Naga-Raja), are worshipped (Ghosh, 1978). The *naga* has a prominent place in ancient folklore, both feared and revered through the ages as part of the daily chores of the agrarian societies. The *naga*, metaphorically "reborn" after casting his skin, symbolises rebirth and healing. With his meandering movement and seasonal emergence during the rains, the *naga* personifies the terrestrial waters. He is also said to possess the powers of self-transformation and foretelling. As the regent of the elements and the giver of rain he is capricious; granting the life-giving waters for the earth's fertility, but also capable of withholding it or unleashing terrible

floods. The term *naga* is also used for the elephant which symbolises the rain clouds (Zimmer, 1990). The *naga* is propitiated by his worship near the water sources, sacred trees or temples, often with votive *naga-kastha* (serpent pole) or *naga-kal* (serpent stone). He is said to dwell in the netherworld, at the bottom of the wells, rivers and seas, and under trees in the bowels of the earth. The ant-hill or ***sarpa-garbha (serpent's womb)***, the gate of the subterranean realm, is a natural altar for *naga* worship. The *naga*, the keeper of the treasures of the underworld and the sea, is said to carry the *naga-mani* (panacea gem) on the head. He is thought to be the protector of the households and villages. The term *naga* is also used for the ancient tribes with the serpent totem. Later, several royal clans drew their descent from the *naga-vanshi* lineages (Vogel, 1972). Most of the animistic beliefs of the rural *naga* cults were absorbed and woven in due course into the complex milieu of Hindu, Jain and Buddhist mythology and art (Fergusson, 2004).

Serpent lore, abundant in the ancient Indian literature, yields a rich harvest in the Mahabharata, the ***Jatakas***, and Kalhana's Rajatarangini (Vogel, 1972). Hundreds of *naga* names appear in these narratives such as Sesa (or Ananta), Vasuki, Airavata, Taksaka, Karkotaka, Kaliya, Sankha, Mani and a host of others (Sircar, 1971). These myths depict the *naga* as native clans and their royalties, heroes, demigods, demons and guardians, often in association with the Water Cosmology. The *nagi* is seldom cited, usually as the charming seductress. Post-Vedic texts relegate Varuna as the lord of the *naga*'s watery realm. The Mahabharata, chiefly the Adi- and Udyoga-Parva, describes the descent and the chronicles of the *naga*, largely maligning them as evil monsters or ruthless protectors of temples (Sircar, 1971). This epic, however, also describe the great cosmic serpents as the churning rope of *samudramanathan* (churning of the ocean) and as the support for Visnu's *ananthasayan* (cosmic slumber). The Pali scriptures ambiguously portrays the *naga* as benign guardians of the West, the sacred trees and the great treasures, who sheltered or adored Buddha (Vogel, 1972) or as spiteful fiends tamed by him (Shaw, 2004). However, in the ***Jatakas***, the *naga* is the pious soul embodying forbearance and sacrifice. Brave, wise and just, he is a hero, king, monk, *genius loci*, or an ordinary snake identified with three Bodhisattvas and the future Ananda and Sariputra, disciples of Sakyamuni (Vogel, 1972). The Mahayana tradition holds that the original scriptures were revealed by their *naga* custodians to *mahasiddha* Nagarjuna. Both Hindu and Buddhist texts depict the eternal enmity of the *naga* with his winged nemesis, Garuda. Travelogues of the Chinese pilgrims Fa-Hien and Hsuang-Tsang recorded *naga* fables describing them as "dragons." Rajatarangini, the famous chronicle of Kashmir, recounts the local *naga* deities as the eminently popular water spirits (Vogel, 1972).

One of the earliest representations of the *naga* is on an archaic Harappan seal depicting a serpent pair in the natural form with raised hoods, flanking a yogi (Chandra, 1996). Later, enthused by the developing classical mythology, the *naga*

reemerges with symbolic meanings as the characters of visual narratives (Dehejia, 1997), and as decorative elements in ancient monuments across India and beyond (Zimmer, 2001). The naga is portrayed in sculptures and paintings in three iconographic forms: the primitive theriomorphic form with a coiled body and a natural monocephalous or, usually, an exaggerated polycephalous (three, five, seven or nine) hood; the more advanced anthropo-morphic form; and the stylised therio-anthropomorphic form with a human torso and a serpent tail (Vogel, 1972). The human and half-human *nagas*, perhaps signifying their ability to assume the human shape, are generally males with multiple hoods and the *yajnopavita* (sacred thread), or voluptuous females with single hoods. The hood forms the crest on the head or headgear, a canopy above or a halo behind the head. As temple gargoyles, the human or hybrid naga is most commonly depicted as the *dvarapala* (door-keeper) on the jambs and lintels of doors. He is also placed at other strategic positions overlooking the sanctuary's approach. In the company of one or more *nagis*, the *naga* couples are equal sized, but the *naga-raja* is much larger than the consorts of his royal entourage. The *naga* (of the waters) is often poised in the compositions with the *yaksa* (of the earth). The serpent appears in the classical pantheons as subordinate deities who escort, support, adore or protect the principal divinities. Siva, the destroyer, is depicted with a natural cobra symbolising the terrifying weapon of death (Fergusson, 2004). His *lingam* is often sheltered under the elaborated cobra hood. Similar hoods of the theriomorphic *naga* form a cover, while the torturous bodies become the support or milieu of anthropomorphic Visnu, *Parsvnatha* and Buddha. Rarely, the *naga* himself becomes the aniconic symbol of Buddha (Fergusson, 2004). Serpent figures in conjugal union are believed to have magico-religious influence. The auspicious svastika and srivatsa symbols are thought to represent the *naga* mithunas (Chandra, 1996). The erotic sculptures of the serpent mithuna, half-humans figures entwined in a love-knot, symbolise fertility and healing. The *naga* often flanks human mithuna couples (Desai, 1985).

Natural Forms in the Art of Bharhut

The early Buddhist art of India followed an aniconic tradition which avoids directly depicting the Master in the confinement of the human figure. The remnants of the *stupa* of Bharhut from the Sunga period are vestiges of a hitherto magnificent edifice of aniconic art. This art reflects the cultural ethos of the indigenous people, in contrast with the earlier court art of the Mauryas that had profound Achaemenid and Hellenistic influences. Although representing a early phase in the progression that culminated in the classical perfection of the Guptas, the sculptural art of Bharhut holds immense significance in understanding the folk beliefs and cultural values that perceives the natural environmental as sacred, therefore, to be respected, cared and conserved, the necessity of which is now being realized worldwide (Sharma, 1994). The natural forms in the sculptured reliefs on the medallions and

panels of the *toranas* (gateways) and the *vedikas* (railings) help us to appreciate the assortment of life forms from every niche in their true perspective as the transcendent reflections of the formless eternal truth that connect each of them with the another. These forms are in organic connection with the mother earth, which gives them life and nourishment. The flowers, creepers, trees, fishes, amphibians, reptiles, birds and animals have been rendered in abundance with rich symbolism as an integral part of the narrative (Dehejia, 1997) and decorative (Ghosh, 1978) elements. They dominate the human form to emerge as the co-actors and co-sharers with men. Kramrisch (1983) reflects: "earth's life blood streams through the members of the figures and gives them form according to the celerity of its circulation, which is gently flowing, soft and equipoised at Bharhut."

Representations of the Naga in the Narrative Art of Bharhut

The *naga* appears in some of the narrative visuals of Bharhut (Fig. 1-6), usually as the benevolent serpent king, sometimes with his royal family, often worshipping or protecting the Blessed One, in connection with the portrayal of the scenes from the Pali scriptures and the Jatakas, and the donor inscriptions on them in Pali (Brahmi) help identify their themes and characters (Vogel, 1972; Barua, 1979; Zimmer, 1990; Dehejia, 1997).

A railing medallion uses the monoscenic narrative mode (Dehejia, 1997) to recount the legend of Mucalinda (Fig. 1). The Mucalindavagga of the Udana describes the famous serpent king who dwelled in the grove of Uruvela, near Bodh Gaya, under the *mucalinda* tree. He wrapped Buddha, who was absorbed in deep meditation, seven-times with his coils and canopied him under his giant hood during a violent storm during the seventh week of his enlightenment. The epigraph above declares: Mucalinda, King of the Serpents ("*Muchilindo Naga Raja*") who alone occupies the larger part of the relief and is depicted in the reptilian form under the *bodhi* (*asvattha*) tree. The colossal serpent envelopes an empty *bhadrāsana* (seat) and a pair of footprints (symbolising Sakyamuni), covering them under his giant five-headed hood. This is a popular theme which is depicted time and again in the *stupas* of Sanchi, Amaravati, Sarnath, Bodh Gaya and even in South-East Asia. In contrast with Bharhut, the *naga-raja* (with *nagis*) appears at Sanchi in the human form and Buddha is again present as aniconic symbols, but at Amaravati, the *naga-raja* is in the reptilian form, but the other *nagas* and Buddha are in the human form (Kala, 1951). Scholars denote this imagery as "Naga-Buddha" in an attempt to associate it with the indigenous serpent cults so common in South Asia (Pal, 2007). The legend and the images of Muchalinda and Buddha are perfect reconciliations of the antagonistic principles they represent. The serpent symbolizes the life force that perpetuates the cycle of life. The saviour illuminates the path to conqueror life and to escape from the bonds of rebirth (Zimmer, 1990).

Another monoscenic narration (Dehejia, 1997) depicts a key scene excerpted

from the Mani-Kantha Jataka (Fig.2). The affable *naga-rajā* Mani-Kantha (literally, "the jewel throated") insists on befriending a forest-dwelling ascetic, the future Ananda (one of Sakyamuni's principal disciples). This coping relief, framed by a *kalpalata* (creeping vine), depicts the man sitting in a petrified state next to his hut in a forest (suggested by a pair of trees). He has grown thin, pallid and weak due to his morbid fear of the giant serpent, shown sitting before him with a raised five-headed hood and a gemstone on the neck. The viewers must now narrate to themselves the rest of the story recalling the advice of a fellow ascetic (Bodhisattva) to ask the serpent for the jewel to get rid of his persistent presence, and the ascetic's deep regret when he succeeds in doing so. This reminds the viewer that the moral of the fable is to refrain from seeking material gains from the loved-ones.

A minutely carved square relief on the Prasenjit Pillar bears the inscription: Elapatra, King of the Serpents worships the Lord ("*Erapato Naga Raja Bhagavato Vandate*"). The cursed serpent king is depicted three-times (Fig.3) in the more complex synoptic method of narration (Dehejia, 1997). First, in the backdrop, he appears as a five-headed reptile with his daughter (in the human form) standing on his hood raised above in a river (suggested by cranes among lotus blossoms and foliage) before a Brahmin who brings the word of Buddha Sakhyamuni. Next, released from a curse incurred in his previous life during the time of previous Buddha, Kasyapa, he reappears in the foreground as a human, with a five-fold serpent crest, along with two *nagis*, each wearing a single-fold snake crest, and all three in the pose of adoration (*namaskara mudra*). Finally, the *naga* king is shown kneeling with head bowed and hands joined before his saviour (Buddha) who is symbolised by an empty *ratnasana* (jewel seat) decorated with floral motifs under the largest of the six (seven in the literary source) *sirisa* trees with large flowers and decked with a pair of garlands. Elapatra, *alias* Erapata, Erapatha, Erakapatta, Ailapatra, etc. in Pali is derived from "*eraka-patta*" the leaf of the *eraka* tree which he had unrepentantly plucked to earn the curse (Coomaraswamy, 1928). The legend appears with slight variations in the Mahavastu and Buddhaghosha's Dhammapada Atthakatha. The Mahavastu describes Elapatra of Taxila as the richest of the keepers of the four great treasures. Hsuang-Tsang's accounts also mention Elapatra as the guardian deity of a lake near Taxila (Vogel, 1972).

A couple of square reliefs on the Vidura Pillar depict the members of another royal family of serpents (Fig.4-5). These are scenes from the Vidura-Pandita Jataka which covers the entire face of the pillar in the form of an intricate visual storytelling scheme called the narrative network. This is an early example and is the only one of its kind at Bharhut (Dehejia, 1997). The protagonist, the *yaksa* called Punnaka, is repeated in nine separate scenes (where the *naga* appears only in the first and the last) with a network of movement through space and time. Beginning at the top, the opening scene in the mountainous *naga* kingdom depicts Punnaka spellbound

by the beautiful *naga* princess Irandati who is depicted in the human form with the single-fold serpent crest on her head (Fig. 4). Below, the second scene shows only Punnaka (entering the *naga* palace to solicit their marriage, but told to first bring the heart of the wise Vidura). Then, dropping down to the base, the next two scenes in the Kuru palace narrate the *yaksa* trouncing the Kuru king in a game of dice to carry away his vizier Vidura. The action then moves on to the next four scenes crisscrossing the central section of the pillar portraying Punnaka and Vidura's eventful return journey back on the flying horse. The story concludes again at the apex with the final court scene where the suitor brings his wise counsel before the *naga* king Varuna and his queen Vimala (Fig. 5). Like their daughter, earlier, the royal couple, depicted in the human form, are wearing five-fold and single-fold cobra crests, respectively. The two geographical regions, the *naga* realm at the top and the kingdom of the Kurus at the base of the pillar, are apparent at Bharhut, unlike its depiction in a more convoluted network on an Amaravati coping (Dehejia, 1997).

An enigmatic bas relief on another medallion (Fig. 6) is, according to Cunningham (1998), a representation of the Naga-Loka (serpent world). In the upper left quarter there is an ornate triangular recess with a three-headed theriomorphic serpent seated on a *padmasana* (lotus throne). The rest of the medallion is covered by a couple of lions (in the lower left quarter) and a herd of elephants (in the whole of the right half). The epigraphic text: the triangular resort ("*Tikotiho Chahamo*") refers to the three-peaked mountain called Trihuta Parvata which is located over the Naga-Loka. In Buddhist cosmogony, Virupaksha and his *nagas* are the sentinels of the West. Barua (1979) thinks that the triangle is a lake and this is an unidentified narrative from Buddha's life.

Representations of the Naga in the Decorative Art of Bharhut

The *naga* also occasionally appears in a few non-narrative decorative embellishments of the architecture surrounding the central mound of the *stupa* (Fig. 7-9) as the valiant serpent king, at times accompanied by his consorts, appearing to guard the relics of the "Blessed One" (Vogel, 1972; Ghosh, 1978; Barua, 1979).

On a corner pillar of the railing is a life-sized figure (Fig. 7) with the curiously vertical inscription reading: Chakravaka, King of the Serpents ("*Chakavako Naga Raja*"). The serpent king has a human body with a five-headed cobra hood forming a halo above the double knotted ornate turban on the head. He is also wearing earrings, necklaces, armlets and bracelets. He is standing in an attitude of calm repose, with the hands raised in deep adoration of the invisible presence of Buddha. His feet are placed upon a rock in opposite direction as the frontal depiction of the appendages had not emerged at that time (Sharma, 1994). The serenity of the face, whose features are far better than those of most other large figures, is the

result of the calmness of the mind that created them (Kramrisch, 1983). He is depicted near his abode in a lotus pond enlivened with a swan, few cranes and a crocodile (Barua, 1979). The concierge serpent genii, the only surviving example of its kind at Bharhut, is counterbalanced on this pillar with two *yaksas* (earth spirits), Gangita on the reverse and Virudaka on the side of the pillar.

A railing medallion depicts a bas-relief of an anonymous *naga-raja* attended by two *nagins* (Fig. 8). The larger anthropomorphic figure of the serpent king at the centre, clad in the same dress as the other figures, has a large tree-like five-headed hood forming a canopy above his head. The two *nagins* lack crests and are in the mermaid-like hybrid form with the coiled serpent tail present from below the waist. Wearing earrings, necklaces and a girdle, her hand on the side of the king holds a *chowry* (fly whisk) and the other rests on the serpent coil. All three are conspicuous by the absence of any attitude of devotion. Perhaps, these are forerunners of the magico-religious *naga* mithunas abundant in the later ages (Desai, 1985). These female serpent-human hybrids are certainly precursors of this iconographic form that later became the dominant image of the serpent beings in the middle ages.

Another pillar sculpture shows human male and female figures, each standing on the hood of a five-headed cobra (Fig. 9). The female holds a bunch of *sala* flowers in one hand and the other hand is on her hip, the prototype of the classic attitude of the *salabhanjika* (tree dryad), further elaborated on other pillars as the beautiful *yakshis* Chulalkoka and Chandra, and the voluptuous and graceful maidens on the gateways of Sanci. The male figure has his hands folded on his chest in the clichéd position of devotion. However, according to Ghosh (1978), the standing lady on the *naga* accords with the Vishnudharmottara description of the cosmic serpent Ananta as the eternal support of the beautiful earth goddess Prithvi standing on his colossal hood. Similarly the male figure reminds us of the popular *kaliyadaman* theme of Krsna subduing Kaliya, the poisonous serpent of the Yamuna (Ghosh, 1978).

Symbolism of the Naga in the Art of Bharhut

The natural forms in the Bharhut sculptures are not simply a part of the physical landscape, but convey deep symbolic meanings as the characters of the fables or as guardians of the relics (Kramrisch, 1983). This pre-iconic Buddhist art (and that of the contemporaneous art of Sanci), depicts the *naga* only rarely, in contrast with the more modern art of Amaravati, where he is copious, co-existing in harmony with the anthropomorphic Buddha to reach his zenith as the co-equal of the Blessed One (Ferguson, 2004). However, at Bharhut (and Sanchi), the indexical signs of the presence of Buddha excludes the serpent.

The *naga* figures are predominantly in the reptilian and human forms. It was believed that the *naga* appeared among men in the human form up to the waist (Cunningham, 1998). Such hybrid serpent figures, common in the later art (Rao,

1971), are rare here (Fig. 8). In these visual narratives the two serpent forms are simply faithful to the plot. In the legends, the *naga* speaks and appears like humans at will (Vogel, 1972). The theriomorphic form is always polycephalous. The monocephalous serpent, as on a Harappan seal, is absent altogether. The human-like serpent is identifiable by its hood which forms royal or divine symbols such as crest, turban, parasol or nimbus. The multiplication of members as supernumerary cobra heads, common in Indian iconography, suggests the embodiment of supernatural powers. The position of the *naga* in the Buddhist cosmology is as a superhuman demigod (of the water element) along with *apsaras*, *yaksas* and *devas* (Cunningham, 1998).

This *naga* symbolism throws light upon the socio-cultural context in the progress of Buddhism. These sculptures convey the deep bond Buddhism shared with the local agrarian cults, which were slowly assimilated, rather than condemned as in the Asokan edicts (Cunningham, 1887). The artisans, here, translated into stone the religious fervour of their own and that of the donors (Mitra, 1980). The strong link with the animistic beliefs of native cults among the laity is suggested by the bold depiction of the *naga* in the Buddhist fables and as the protector demigods on the gates and railings around the central mound housing the sacred relics. This is also evident in the votive inscriptions on them, such as the one stating: the gift of the nun Naga ("*Nagaye Bhichhunye Danam*"). Thus this symbolism in the post-Mauryan art of Bharhut represents the reversion to the much older popular indigenous style. The use of this symbol also highlights the position of women in the society. The female counterpart has smaller size, simpler hood (Fig. 5), limited presence, their exclusion from the central focus (Fig. 8), and the multiplicity of consorts (Fig. 3), are signs of the inferiority of their sex, agreeing with a misogynist strain in the doctrines of early Buddhism (Gross, 1992). However, their association with the *salabhanjika* symbolises procreation and abundance.

Conclusion

Serpent worship predated Buddhism. Wherever Buddhism took roots, the local population had been propitiating their local deities for eons. Buddha himself had preached in a theistic world sharing an ambiguous relationship with it. Although he had questioned the existence of the deities, even the earliest Buddhist traditions describe his tryst with local and classical divinities. As Man dwell and labour within the web of Maya, the demigods of the heavens (*apsaras*), the waters (*nagas*), the earth (*yaksas*) and the vegetation (*vriksha-devatas*) lures, encloses, and comforts the earthlings with the temporal pleasures (Zimmer, 1990). Countless myths record the antagonism of these local spirits to Buddha, albeit ending predictably in their assimilation as evident in the art of Bharhut (Keown and Prebish, 2007). The enduring belief in the sacredness of the *naga* is therefore yet another beautiful facet of India as a vast and timeless melting pot of culture which fuses diverse ideas into a harmonious whole.

Bibliography

- Barua, B.M. *Bharhut*. Indological Book Corporation, Patna, 1979.
- Chandra, R.G. *Indian Symbolism: Symbols as Sources of Our Customs and Beliefs*. Munshiram Manoharlal Publishers, New Delhi, 1996.
- Coomaraswamy A.K. Erakapatra Nagaraja. *Journal of the Royal Asiatic Society*, 60 (3), 629-630, 1928.
- Cunningham, A. *Corpus Inscriptionum Indicarum: Inscriptions of Asoka*. Calcutta, 1877.
- Cunningham, A. *The Stupa of Bharhut: a Buddhist Monument Ornamented with Numerous Sculptures Illustrative of Buddhist Legend and History in the Third Century B.C.* Munshiram Manoharlal Publishers, New Delhi, 1998.
- Dehejia, V. *Discourse in Early Buddhist Art, Visual Narratives of India*. Munshiram Manoharlal Publishers, New Delhi, 1997.
- Desai, D. *Erotic Sculpture of India: A Socio-Cultural Study*. Munshiram Manoharlal Publishers, New Delhi, 1985.
- Fergusson, J. (2004) *Tree and Serpent Worship*. Asian Educational Services, New Delhi.
- Ghosh, A. *Remains of Bharhut in the Indian Museum*. Indian Museum, Calcutta, 1978.
- Gross, R.M. *Buddhism after Patriarchy: a Feminist History, Analysis and Reconstruction of Buddhism*. State University of New York Press, New York.
- Handa, O.C. *Naga Cults and Traditions in Western Himalayas*. Indus Publishing Co., Delhi, 2004.
- Kala, S.C. *Bharhut Vedika*. Municipal Museum, Allahabad, 1951.
- Keown, D. and Prebish, S.C. *Encyclopedia of Buddhism*. Routledge, London.
- Kramrisch, S. (1983) The representation of nature in early Buddhist sculpture (Bharhut- Sanchi). In: Miller, B.S. (Ed.) *Exploring India's Sacred Art*, pp. 123-129. Pennsylvania Press, Philadelphia, 2007.
- Mitra, D. *Buddhist Monuments*. Munshiram Manoharlal Publishers, New Delhi, 1980.
- Pal, P. An unusual naga protected Buddha from Thailand. *Marg*, 58 (3) 52-63, 2007.
- Rao, T.A.G. *Elements of Hindu Iconography*. Indological Book House, Varanasi, 1971.
- Sharma, R.C. *Bharhut Sculptures*. Abhinav Publications, Delhi, 1994.
- Shaw, J. Naga sculptures in Sanchi's archaeological landscape: Buddhism, Vaishnavism and local agricultural cults in central India, first century B.C.E. to fifth century C.E. *Artibus Asiae*, 64 (1) 5-59, 2004.
- Sircar, D.C. *Studies in the Religious Life of Ancient and Medieval India*. Motilal Banarsidass, Delhi, 1971.
- Vogel, J.P.H. *Indian Serpent Lore*. Indological Book House, Varanasi, 1972.
- Zimmer, H. *Myths and Symbols in Indian Art and Civilization*. Sundeep Prakashan, New Delhi, 1990.
- Zimmer, H. *The Art of Indian Asia: Its Mythology and Transformations*. Motilal Banarsidass, Delhi, 2001.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

*Fig. 1. Naga-raj Mucalinda; Fig. 2. Naga-raj Mani-Kantha;
Fig. 3. Naga-raj Elapatra and nagis; Fig. 4. Nagi Irandati.*



Fig. 5.



Fig. 6.



Fig. 8.



Fig. 7.



Fig. 9.

Fig. 5. *Naga-raj* Varuna and his *nagi* Vimala;
 Fig. 6. *Naga* in a triangular recess;
 Fig. 7. *Naga-raj* Chakravaka;
 Fig. 8. *Naga-raj* flanked by two *nagis*;
 Fig. 9. *Nagas* supporting humans.

বাংলার প্রাচীন রাজপথ : ইতিহাসের প্রেক্ষাপটে, প্রত্নতত্ত্বের আলোকে (খ্রীষ্টীয় প্রথম - ঊনবিংশ শতক)

তপন কুমার দাস

দেশীয় সাহিত্য ও লিপিমাল্য এবং বিদেশীদের বর্ণনায় বাংলা তথা ভারতের অসংখ্য প্রাচীন অর্ন্তদেশীয় ও বর্হিদেশীয় রাজপথের বর্ণনা পাওয়া যায়। সরেজমিনে অনুসন্ধান করলে এরকম অনেক প্রাচীন রাজপথের ধ্বংসাবশেষ চোখে পড়ে - যে গুলি শতাধিক গ্রাম, জনপদ, শহর, নগর, বন্দর, খেয়াঘাট স্পর্শ করে বাংলার অভ্যন্তরের এবং বর্হিদেশের বিভিন্ন নগর, শহর এবং প্রত্নস্থলের সঙ্গে যোগসূত্র রচনা করেছে। অথচ দুঃখের বিষয় আমাদের বঙ্গদেশের প্রাচীন রাজপথের উপর কোন নির্ভরযোগ্য বিবরণ হাতে নেই। প্রখ্যাত শিল্পশাস্ত্রবিদ নীহার রঞ্জন রায় তাঁর বাঙালির ইতিহাস - আদিপর্বে বাংলার অভ্যন্তরিন এবং বর্হিদেশীয় রাজপথ নিয়ে কিছু আলোচনা করেছেন। কিন্তু তাঁর সেই আলোচনা পূর্ণাঙ্গ নয়। রাজপথগুলি কোথা থেকে উৎপন্ন হয়ে, কোন কোন শহর, বন্দর, জনপদ ছুঁয়ে কোথায় পৌঁছাত তার পূর্ণাঙ্গ বর্ণনা পাওয়া যায় না। বৈজ্ঞানিক পদ্ধতিতে ক্ষেত্রানুসন্ধান করলে আজও বাংলার প্রাচীন রাজপথের একটা পূর্ণাঙ্গ আলোচনা করা সম্ভব হবে। বাঙ্গালীর ইতিহাসে নীহার রঞ্জন রায় বলেছেন - আজকের বর্তমান রেলপথগুলি সবই প্রাচীন রাজপথের ওপরেই নির্মাণ করা হয়েছে। কিন্তু এ ধারণা অনৈতিহাসিক। প্রাচীন রাজপথগুলি তার গতিপথে অসংখ্য গ্রাম, নগর, জনপদ ভেদ করে প্রসারিত হয়েছে। রাজপথে চলমান সেকালের যানবাহনগুলির চলার পথে রাস্তাঘাট আকাবঁকা হলেও চলত। কিন্তু রেলপথগুলি অতিরিক্ত আঁকাবঁকা পথে প্রসারিত হতে পারে না। তাদের পথ সরল রেখায় রাখতেই হবে। তাই দেখা যায়, বর্তমানের রেলপথগুলি মাঠ-প্রান্তর ভেদ করে সরল রেখায় প্রসারিত হয়েছে। ক্ষেত্রানুসন্ধান করলে দেখা যাবে বাঙলার রাজপথগুলি আজও টিকে আছে অনেক স্থানে, তাদের গতিপথও ভিন্ন।

গতানুগতিক ভাবে ধারণা জন্মেছে যে বাংলা নদী মাতৃক দেশ। এখানে জলপথই একমাত্র পথ ছিল। তথাকথিত এই ধারণা যে অনৈতিহাসিক তা বোঝা যায় ক্ষেত্রানুসন্ধান করলেই। তাছাড়া বাংলার সব অংশই তো আর নদ-নদীবহুল নয় এবং সব নদ-নদীতেই তো আর সারা বছর জল থাকে না। পশ্চিমের ছোটনাগপুর মালভূমি অঞ্চল থেকে বর্ষার জলে পুষ্ট নদ-নদীগুলি তো বছরের অধিকাংশ সময়েই শুকিয়ে যায়। তাই, জলপথই যে একমাত্র পথ ছিল তা ঠিক নয়। জলপথের পাশাপাশি অসংখ্য রাজপথ ও স্থলপথও ছিল। পরিকল্পিতভাবে, বৈজ্ঞানিক পদ্ধতিতে গবেষণার অভাবই বাংলার রাজপথগুলির পূর্ণাঙ্গ আলোচনায় বাধা হয়ে দাঁড়িয়েছে।

বাংলার গ্রামে-গঞ্জে, জনসাধারণের মুখে মুখে এরকম অনেক প্রাচীন রাজপথের নাম শোনা যায়। সরেজমিনে ক্ষেত্রানুসন্ধান করে দেখা গেছে, এরকম অনেক প্রাচীন রাজপথ আজও কোন অঞ্চলে 'মাড়ি', কোথাও 'জাঙ্গাল', আবার কোথাও 'রাজসড়ক', 'পাদশাহী সড়ক' বা 'বাদশাহী' সড়ক নামে খ্যাত হয়ে আছে। বলাবাহুল্য, ঐতিহ্যবাহী এই সকল প্রাচীন রাজপথগুলি বাংলার অর্থনীতিতে, বাণিজ্যিক আদান-প্রদানে, তীর্থযাত্রায় এবং রাষ্ট্রীয় ও সাংস্কৃতিক যোগসূত্র রক্ষায় গুরুত্বপূর্ণ ভূমিকা পালন করেছে - শতাব্দীর পর শতাব্দী ধরে। রাজনৈতিক উত্থান-পতনে একদেশ অন্য দেশের করায়ত্ত হয়েছে, এক পট পরিবর্তনেও দেখা গেছে, একই রাজপথ বারবার পুনঃসংস্কার হয়ে পরবর্তি

রাজা বা সম্রাটের অধীন হয়েছে। কারণ, পথ ছাড়া কোন সাম্রাজ্যই টিকে থাকতে পারে না। পথই সাম্রাজ্যের উত্থান-পতনের, অর্থনৈতিক স্বচ্ছলতার এবং রাজনৈতিক ও সাংস্কৃতিক যোগাযোগের একমাত্র মাধ্যম।

বাংলার গ্রামে-গঞ্জে, প্রাচীন, প্রত্নস্থল, মন্দির, মসজিদ, বৌদ্ধ ও জৈন ধর্মের পাঠস্থান, সরাই বা পান্থশালা, গড়-দুর্গ কেল্লা, প্রাচীন বৃক্ষ, পাতকুয়া, ইজারা, দীঘি বা পুষ্করিনীর অবস্থান দেখে এটাই সিদ্ধান্ত করা যায় যে, প্রাচীন পথের ধারে ধারেই এই সমস্ত ধর্মীয়; সাময়িক এবং সাংস্কৃতিক কেন্দ্র গুলি গড়ে উঠেছিল - যেগুলি আজও প্রত্নস্থল বা প্রত্নকীর্তি হিসাবে টিকে থেকে প্রাচীন রাজপথের ইঙ্গিত দিচ্ছে। ক্ষেত্রানুসন্ধানে দেখা গেছে যে, কোন একটা প্রাচীন রাজপথের ধারে হয়ত অবস্থান করছে কোন মৌর্য, গুপ্ত বা পালযুগের প্রত্নস্থল, বা প্রত্নসৌন্দর্য অথবা তার ধ্বংসাবশেষ, সেই রাজপথের ধারেই আবার চোখে পড়ে কোন পাঠান বা মুঘল আমলের প্রত্নস্থল বা প্রত্নসৌন্দর্য অথবা তার ধ্বংসাবশেষ। অর্থাৎ প্রাচীন গুপ্তযুগ বা পালযুগ থেকে পাঠান-মুঘল আমল পর্যন্ত সময়ে যে সেই রাজপথটি বাংলা তথা ভারতবর্ষের জনজীবন একটা গুরুত্বপূর্ণ প্রভাব বিস্তার করেছিল তা খুব সহজেই অনুধাবন যোগ্য। আবার, পরবর্তীকালে দেখা যায় সেই সমস্ত রাজপথ ধরেই কখনও পায়ে হেঁটে, কখনও পালকিতে চড়ে, আবার কখনও বা শকটবাহী যানে চেপে কোন বিদেশী পর্যটক, খ্রীষ্টান মিশনারী বা ব্রিটিশ প্রত্নতত্ত্ববিদের স্থান থেকে স্থানান্তরে গমনাগমন। ব্রিটিশ আমলের এরকম অসংখ্য বিদেশীদের দিনলিপিতে, গ্রন্থে এবং সরকারী প্রতিবেদনে বাংলা তথা ভারতের অসংখ্য অর্ন্তদেশীয় এবং বর্হিদেশীয় প্রাচীন রাজপথের বর্ণনা পাওয়া যায় - যেগুলি আজও টিকে আছে - প্রাচীন ইতিহাসের সাক্ষী হিসাবে।

এই কারণেই বোধহয় প্রখ্যাত ব্রিটিশ প্রত্নতত্ত্ববিদ মার্টিন বলে গেছেন যে প্রত্নস্থল বা প্রত্নকীর্তির সন্ধান করেই প্রাচীন রাজপথকে অনুসন্ধান করতে হবে। তাঁর এই উক্তি যে প্রবাসত্য তা বোঝা যায় বাংলার গ্রাম-গঞ্জে অসংখ্য প্রত্নস্থল বা প্রত্নকীর্তির পাশাপাশি প্রাচীন রাজপথের অবস্থান দেখলে। খ্রীষ্টীয় সপ্তম শতকে বিখ্যাত চৈনিক পরিব্রাজক হিউয়েন-সাঙ বা ইং-সিং -এর বর্ণনায়; খ্রীষ্টীয় দশম শতকের গ্রন্থ চর্যাপদে এবং খ্রীষ্টীয় একাদশ-দ্বাদশ শতকে রচিত মীনহাজ-উদ্দিন সিরাজের তবাকৎ-ই-নাসিরী গ্রন্থে, ষোড়শ শতকে আবুল ফজলের আইন-ই-আকবরী এবং আকবরনামা গ্রন্থে, অষ্টাদশ শতকে রচিত জেমস রেনেলের *Bengal Atlas Memoirs of a Map of Hindusthan* -এবং *Roads of Bengal and Bahar* (বিহার) গ্রন্থে, কৃষ্ণরাম ভট্টাচার্যের মহারাষ্ট্র পুরাণে, চৈতন্য চরিতামতে, ভারতচন্দ্র রায়গুণাকার লিখিত অন্নদামঙ্গল ও মানসিংহ কাব্যে, P. B. Shelly -র ভারতের রাজপথে সম্বন্ধীয় গ্রন্থে, হাকুলেং সোসাইটির Ludovico di Verthema গ্রন্থে, Bradshaw -র বাংলার প্রেসিডেন্সির বর্ণনায় বাংলার অসংখ্য অর্ন্তদেশীয় এবং বর্হিদেশীয় রাজপথের সন্ধান পাওয়া যায়। এছাড়াও, অষ্টাদশ ও উনবিংশ শতকে ব্রিটিশ প্রশাসক, প্রত্নতত্ত্ববিদ এবং খ্রীষ্টান মিশনারীরা বাংলা এবং বাংলার বাইরে গবেষণার উদ্দেশ্য এবং ধর্মীয় ও ব্যক্তিগত কারণে একস্থান থেকে অন্য স্থানে গমনাগমন করতেন। তাঁদের সেই পরিভ্রমনের বর্ণনা তাঁরা রেখে গেছেন অসংখ্য গ্রন্থ এবং ব্যক্তিগত দিনলিপিতে। বাংলাকে নিজের চোখে দেখে যে বর্ণনা তাঁরা রেখে গেছেন সেগুলি সে যুগের আর্থসামাজিক এবং সাংস্কৃতিক ইতিহাস রচনার উল্লেখযোগ্য দলিল।

পৃথিবীর সকল দেশেই পথ পরিষেবার উদ্দেশ্যে পথিকদের রাত্রিবাসের জন্য পান্থশালা বা সরাই নির্মাণ একটি গুরুত্বপূর্ণ জনহিতকর কাজ বা পুণ্য কাজ বলে বিবেচিত। বাংলাও এই নিয়মের ব্যতিক্রম নয়। বাংলার বিভিন্ন স্থানে প্রাপ্ত সরাই বা পান্থশালাগুলির ধ্বংসাবশেষ, প্রাচীন রাজপথের ইঙ্গিতবাহী। সাধারণ মানুষ তীর্থযাত্রায়, দৈনন্দিক কাজকর্মে অথবা বণিকের দল হাঁটাপথে বা শকটবাহী যানে চেপে স্থান থেকে স্থানান্তরে গমনের উদ্দেশ্যে বিভিন্ন সরাইখানা বা পান্থশালায় রাত্রি অতিবাহিত করতেন। ভারতীয় দর্শনে ও ধর্মে যাবতীয় পুণ্য কাজের মধ্যে সরাই বা

পাথুরাশালা নির্মাণ একটি গুরুত্বপূর্ণ ভূমিকা পালন করত। তাই, প্রাচীনকাল থেকেই পথিকদের সুবিধার জন্য পথের ধারে ধারে অসংখ্য সরাই বা পাথুরাশালা নির্মাণ করার কথা জানা যায়। প্রাচীন স্থলপথের মত এই সমস্ত সরাই বা পাথুরাশালাগুলিও বরাবর সংস্কার অথবা পূর্ণনির্মাণ যে হত - তার প্রমাণও পাওয়া যায় প্রত্নতাত্ত্বিক গবেষণায়। বাংলার অসংখ্য অর্ন্তদেশীয় এবং বর্হিদেশীয় প্রাচীন রাজপথের ধারে ধারে এরকম অনেক সরাই বা পাথুরাশালা দেখা যায়।

পথ পরিষেবার আর একটি গুরুত্বপূর্ণ মাধ্যম হল পথের ধারে ধারে কূপ, দীঘি বা ইজারা খনন এবং বট, অশ্বথ প্রভৃতি দীর্ঘজীবী বৃক্ষরোপন। সরাই বা পাথুরাশালার পাশাপাশি প্রাচীন বৃক্ষ বা প্রাচীন দীঘিগুলিও সেকালের প্রাচীন রাজপথের ঐতিহ্য স্মরণ করায়। পথিক বা তীর্থযাত্রীদের তৃষ্ণানিবারণের জন্য বা পথশ্রমের ক্লান্তি দূর করে বিশ্রামের জন্য পথের ধারে ধারে বট, অশ্বথ প্রভৃতি বৃক্ষ রোপন, দীঘি বা ইজারা কর্তণ পূণ্য কাজ বা জনহিতকর কাজের একটি অঙ্গ। বাংলার গ্রামে-গঞ্জে এরকম অসংখ্য প্রাচীন দীঘি, কূপ, ইজারা বা প্রাচীন বৃক্ষ চোখে পড়ে। ক্ষেত্রানুসন্ধানে দেখা গেছে এই সমস্ত দীঘি বা কূপের বা বৃক্ষের পাশাপাশি কোন রাজ বা সড়ক পথ। সেই সড়ক পথগুলি যে অতীতের বহুল প্রচলিত সমৃদ্ধ রাজপথ, তা সহজেই অনুধাবন করা যায়। কারণ নিকটবর্তী বা দূরবর্তী কোন স্থানে, সেই পথের ধারে ধারেই চোখে পড়ে প্রাচীন প্রত্নস্থল বা প্রত্নকীর্তি। এ থেকে বুঝতে অসুবিধা হয়না যে আলোচ্য পথটি প্রাচীন পথেরই অবশেষ।

প্রাচীন গড়, দুর্গ বা কেল্লার ধ্বংসাবশেষগুলিও বাংলার অতীত রাজপথের নির্দেশ দেয়। সাধারণত গড়-দুর্গ বা কেল্লার মত প্রতিরক্ষা কেন্দ্রগুলি কোন রাজপথের ধারে কিংবা রাজপথ এবং জলপথের সংযোগস্থলে গড়ে উঠত। বাংলার অসংখ্য স্থানে শত শত গড়-দুর্গ-কেল্লার ধ্বংসাবশেষ থেকে একথাই সমর্থিত হয়। ক্ষেত্রানুসন্ধান করে বাংলার অভ্যন্তরে এবং সীমান্তবর্তী অঞ্চল এরকম অসংখ্য গড়, দুর্গ বা কেল্লার ধ্বংসাবশেষের পাশাপাশি প্রাচীন রাজপথের সন্ধান পাওয়া গেছে। মুঘল এবং ব্রিটিশ আমলে নির্মিত মানচিত্রগুলি পর্যালোচনা করে উপরিউক্ত পথগুলির প্রাচীনত্ব নির্ধারন করা যায়।

প্রাচীন হিন্দু মন্দির, বৌদ্ধ, স্তূপ, চৈত্য বা বিহার, জৈন তীর্থক্ষেত্র বা মুসলিম মসজিদ, দরগাহ, ইদগাহ, মাজার বা খানকা এবং খ্রীষ্টান গির্জাগুলি প্রাচীন রাজপথের সূচক। সাধারণতঃ আজকের মত অতীতেও ধর্মস্থান বা তীর্থস্থানগুলি গড়ে উঠত কোন প্রাচীন রাজপথ বা জলপথের ধারে ধারে। এই সমস্ত প্রত্নকীর্তির ধ্বংসাবশেষগুলি সেকালের বহিষ্কৃত জনপদ এবং সমৃদ্ধ রাজপথের ইঙ্গিত দেয়। বাংলার অসংখ্য স্থানে হিন্দু, বৌদ্ধ, জৈন এবং ইসলামী ধর্মীয় স্থাপত্য ও প্রতিষ্ঠানের ধ্বংসাবশেষের পাশাপাশি অতীতের অনেক প্রাচীন রাজপথের বা স্থলপথের সন্ধান পাওয়া যায়।

বাংলা ভূখণ্ডের ভিতরে একস্থান থেকে অন্যস্থানে, অসংখ্য তীর্থক্ষেত্রে এবং হাটে-বাজারে, গ্রামে-গঞ্জে, নগরে-বন্দরে, দৈনন্দিন কাজকর্মে, বাণিজ্যিক আদান-প্রদানের জন্য যে অসংখ্য পথ ছিল, তা সহজেই অনুমান করা যায়। প্রত্নতাত্ত্বিক অনুসন্ধান-আবিষ্কার সেই অনুমানকে আরো বেশী জোরালো করে। কিন্তু বাংলার বাইরে প্রতিবেশী রাজ্য বা প্রতিবেশী রাষ্ট্রে গমনাগমনের জন্য যে অসংখ্য বর্হিদেশীয় রাজপথও ছিল সে তথ্যও সুবিদিত। সোমদেবের কথাসরিৎ সাগরে উত্তর বাংলার পুন্ড্রবর্ধন নগরী থেকে পাটলিপুত্র (বর্তমান বিহার রাজ্যের পাটনা) পর্যন্ত যে একটি সুদীর্ঘ রাজপথ ছিল তা জানা যায়। খ্রীষ্টীয় সপ্তম শতকে হিউয়েন সাং তাম্রলিপ্ত থেকে হাঁটাপথে রাজপথ ধরে কর্ণসুবর্ণ মহানগরী রক্তমুক্তিকা মহাবিহারে গিয়েছিলেন। এই রক্তমুক্তিকা মহাবিহার এবং কর্ণসুবর্ণ মহানগরী যে বর্তমান মুর্শিদাবাদ জেলার চিরুটি অঞ্চল তা প্রমাণ করেছেন প্রখ্যাত প্রত্নতত্ত্ববিদ সুধীররঞ্জন দাস, ১৯৬১ সালে।

বিহারের হাজারি বাগ জেলার দুধপাণি পাহাড়ের একটি গুহা লিপিতে (অষ্টম শতক) তাম্রলিপ্ত থেকে অযোধ্যা পর্যন্ত একটি সুদীর্ঘ রাজপথের কথা বলা হয়েছে। সপ্তম শতকের দ্বিতীয়ার্ধে হিউয়েন সাং বারাণসী, বৈশালী, রাজগীর, নালন্দা, কজঙ্গল কামরূপ, সমতট, তাম্রলিপ্ত, কর্ণসুবর্ণ, ওড়্র, কঙ্গোদ, কলিঙ্গ প্রভৃতি স্থানে পরিভ্রমণ করেছিলেন প্রাচীন রাজপথ ধরেই। হিউয়েন সাং বর্ণিত সকল পথই পরিবর্তি কালেও যে ব্যবহার যোগ্য ছিল এবং ব্যবহার করা হতো এমন প্রমাণও পাওয়া যায় পরবর্তী কালের বিবরণে ও প্রত্নাবিস্কারে।

প্রাচীন সাহিত্য, হিউয়েন সাং, ইংসিং প্রমুখ চৈনিক পরিব্রাজকের ভ্রমণ বৃত্তান্ত, সেনরাজ লক্ষ্মন সেনের সভাকবি, ধোয়ির পবনদূত, মিনহাজ উদ্দিন সিরাজের তবকাৎ-ই-নাসিরী, চৈতন্য চরিতামৃত, আবুল ফজলের আইন-ই-আকবরী, ভারত চন্দ্রের অন্নদামঙ্গল, রামেশ্বর ভট্টাচার্যের মহারাষ্ট্র পুরাণ, জেমস রেনেল, পি.বি. শেলি, James Peggs এবং বিভিন্ন খ্রীষ্টান মিশনারীদের বর্ণনা এবং ঈশ্বরচন্দ্র বিদ্যাসাগরের রচনাবলী সঙ্গে প্রত্নতাত্ত্বিক উপাদান-উপকরণকে পাশাপাশি রেখে ব্যাখ্যা করলে দেখা যায় প্রাচীন কাল থেকে মধ্যযুগ পর্যন্ত বাংলার অভ্যন্তরে ও বাংলার বাইরে যাতায়াতের জন্য অসংখ্য অন্তর্দেশীয় এবং বহির্দেশীয় রাজপথ প্রসারিত ছিল।

একটি পথ প্রসারিত ছিল বাংলা থেকে সেন্ট পিটার্সবার্গ পর্যন্ত। এই পথটির সঙ্গে বাংলার বিভিন্ন দিক থেকে আগত অসংখ্য রাজপথ যুক্ত ছিল। দ্বিতীয় একটি পথ ছিল দক্ষিণ বাংলা থেকে কাশিমবাজার পর্যন্ত। বাংলা থেকে ৩টি পথ তিনদিক দিয়ে প্রসারিত হয়ে পৌছেছিল নাগপুর পর্যন্ত। প্রথম পথটি বেনারস হয়ে এবং দ্বিতীয় পথটি মেদিনীপুর শহর ছুয়ে। তৃতীয় আরেকটি পথ ছিল উড়িষ্যার বালাসোর হয়ে। ঊনবিংশ শতকের প্রথমার্ধে বাংলার বুকে 'বর্গী' আক্রমণের যে ঢেউ আছড়ে পড়েছিল, মারাঠা নায়ক ভাস্কর পন্ডিতের নেতৃত্বে, সেই আক্রমণ তো ধেয়ে এসেছিল পূর্বোক্ত তিনটি পথ ধরেই। সেকালের বাংলা থেকে দক্ষিণ ভারতের মাদ্রাজ পর্যন্ত, আরেকটি পথের সন্ধান পাওয়া যায়, যেটি বর্তমান উত্তর ২৪ পরগণার ব্যারাকপুর হয়ে মেদিনীপুর ছুয়ে, উড়িষ্যার কলিঙ্গপট্টনম ভেদ করে মাদ্রাজ পৌছাতে। খ্রীষ্টীয় একাদশ শতকের তিরুমলাই শিলালিপি থেকে জানা যায় যে চোলরাজ রাজেন্দ্র চোল 'তরুণ-লাচম' বা দক্ষিণরাঢ় জয় করে অপার-মন্দার এর রাজ্য রণাসুরকে পরাজিত করেছিলেন। এই অপার-মন্দার যে বর্তমান হুগলী জেলার গড়মন্দারন তা ঐতিহাসিকেরা স্বীকার করে নিয়েছেন। তা যদি হয় তা হলে পূর্বোক্ত ব্যারাকপুর - হুগলী - আরামবাগ - মেদিনীপুর - উড়িষ্যা পথ ধরেই রাজেন্দ্র চোল বাংলায় অভিযান পরিচালনা করেছিলেন সিদ্ধান্ত করা যায়। বাংলা থেকে উড়িষ্যার গঞ্জাম পর্যন্ত আর একটি পথের সন্ধান পাওয়া গেছে। বাংলা থেকে পূর্ব ও উত্তর-পূর্ব ভারতের, দক্ষিণ ভারতের এবং উত্তর-পশ্চিম ভারতের যে কোনো স্থানেই গমনা-গমনের জন্য অসংখ্য রাজপথ ছিল - যে পথগুলি বাংলার অসংখ্য আভ্যন্তরীন রাজপথের সঙ্গে যুক্ত ছিল। পূর্বোক্ত পথগুলি ছাড়াও বাংলার দক্ষিণাঞ্চল থেকে শাশারাম, কানপুর, হায়াদ্রাবাদ, বাখেরগঞ্জ, কৃষ্ণনগর, খেজুরি কুলপি, মুর্শিদাবাদ, রঘুনাথপুর, ধনেখালি, বাঁকিবাজার, ঢাকা, জাফরগঞ্জ, কুমারখালি, দিগনগর, গৌড়, রংপুর, কোচবিহার, ত্রিপুরা, মুঙ্গের, নাগোর, রংপুর, সিলেট, সুলতানপুর, আসাম, কামরূপ, গৌহাটি, তিব্বত প্রভৃতি জনপদের সঙ্গে যোগাযোগ রক্ষার জন্য অসংখ্য আভ্যন্তরীন ও বহির্দেশীয় রাজপথ যে ছিল - তা ঐতিহাসিক ভাবেই সত্য।

বাংলার উত্তরে চীন ও তিব্বত এবং উত্তর-পূর্ব দিকে আসাম ও কামরূপ। উত্তরবঙ্গ এবং ঢাকা হয়ে আসাম কামরূপের ভিতর দিয়ে চীনে, তিব্বত এবং ব্রহ্মদেশ পর্যন্ত বাণিজ্যিক ও সাংস্কৃতিক যোগাযোগের একটি প্রশস্ত রাজপথ ছিল। এই পথটির একটি নির্ভরযোগ্য এবং গ্রহণযোগ্য বিবরণ পাওয়া যায় চৈনিক পরিব্রাজক হিউয়েন সাং এবং কিয়াতানের ভ্রমণ বৃত্তান্তে, চীনা রাজদূত চাংকিয়েনের বর্ণনায় এবং মিনহাজ উদ্দিন সিরাজের তবকাৎ-ই-নাসিরীর বর্ণনায়। সেন শাসনের শেষ পর্বে বখতিয়ার খিলজির বাংলা থেকে আসাম-তিব্বত অভিযান প্রসঙ্গে সুবিখ্যাত

শিলালিপিতে যে পথের বর্ণনা দেওয়া হয়েছে, আলোচ্য পথটিই হিউয়েন সাং বর্ণিত সেই প্রাচীন পথ - এ তথ্য ঐতিহাসিকভাবে প্রতিষ্ঠিত।

বাংলা থেকে কামরূপ, মণিপুর, আফগানিস্তান এবং উত্তর ব্রহ্মদেশে যাওয়ার প্রাচীন এক রাজপথের খবর পাওয়া যায়। খ্রীষ্টপূর্ব ১২৬ অব্দে চাংকিয়েন নামে এক চীনা রাজদূতের প্রতিবেদনে দক্ষিণ চীন থেকে আরম্ভ করে উত্তর ব্রহ্মদেশ ও মণিপুরের ভেতর দিয়ে কামরূপ হয়ে আফগানিস্তান পর্যন্ত একটি সুদীর্ঘ ও সুপ্রশস্ত প্রাস্তাতিপ্রাস্ত পথের কথা বলা হয়েছে। চাংকিয়েন আমাদের জানাচ্ছেন যে ব্যাকট্রিয়ার বাজারে দক্ষিণ চীনের য়ুনান ও সজ্জেচোয়ান প্রদেশে উৎপন্ন রেশমী বস্ত্র এবং সুক্ষ বাঁশ আসত চীন থেকে আফগানিস্তান পর্যন্ত বিস্তৃত উত্তর ভারত জুড়ে লম্বা সুদীর্ঘ পথ বেয়ে, শকটবাহি গাড়িতে চড়ে। সজ্জেচোয়ান থেকে কামরূপ পর্যন্ত এই পথের সংবাদ প্রায় ৮০০ বছর পর হিউয়েন সাং ও আমাদের জানিয়েছেন। নবম শতকে কিয়াতান নামে আর এক পরিব্রাজক এই পথের খবর দিয়ে গেছেন। তবকাৎ-ইৎ-নাসিরী গ্রন্থের প্রণেতা মিনহাজউদ্দিন সিরাজও এই পথের কথা বলে গেছেন। কামরূপে এসে এই পথটি চাংকিয়েন বর্ণিত পথের সঙ্গে মিলিত হয়ে উত্তরবঙ্গের কজঙ্গল হয়ে মগধ পর্যন্ত বিস্তৃত ছিল। তিব্বতের সঙ্গে যোগাযোগের আর একটি পথ ছিল - সেটি উত্তর বাংলার জলপাইগুড়ি, দার্জিলিং, সিকিম, ভূটান, হয়ে হিমালয়ের গিরিবর্তের ভিতর দিয়ে তিব্বতের ভূখণ্ড ভেদ করে চীনদেশ পর্যন্ত বিস্তৃত ছিল। খ্রীষ্টীয় প্রথম শতকে পেরিপ্লাস গ্রন্থে বলা হয়েছে, চীনদেশ থেকে যে রেশমজাত দ্রব্যের আমদানীর কথা বলা হয়েছে তা এই পথেই আসত বলে ঐতিহাসিকেরা মনে করেন। পূর্বোক্ত পথগুলি ছাড়াও বাংলা থেকে ত্রিপুরা মণিপুর চট্টগ্রাম-আরাকান এবং তাম্রলিপ্ত থেকে দক্ষিণ ভারতের সঙ্গে যোগাযোগের জন্য সুপ্রশস্ত যে প্রাচীন পথের সংবাদ পাওয়া যায় তা মধ্যযুগ অতিক্রম করে অষ্টাদশ উনবিংশ শতক পর্যন্ত ব্যবহারযোগ্য ছিল তার অসংখ্য প্রমাণ পাওয়া যায়।

উপরিবর্ণিত রাজপথগুলি অনেকগুলিই আজও অনুসরণ করা যায়। তবে তা অত্যন্ত আয়াসসাধ্য। ব্রিটিশ আমলে এবং স্বাধীনতা - পরবর্তী সময়ে নতুন নতুন অনেক রেলপথ, রাজপথ এবং অভ্যন্তরীণ সড়কপথ নির্মানের ফলে প্রাচীন রাজপথগুলি বেশির ভাগই আজ লোকচক্ষুর আড়ালে পড়ে আছে এবং প্রাচীন রাজপথগুলি ধারে ধারে অবস্থিত বর্ষিষ্ণু, সমৃদ্ধশালী জনপথগুলি তাদের অতীত ঐতিহ্য হারিয়ে গম্ভীরামে পরিণত হয়েছে। কিন্তু প্রত্নতাত্ত্বিক উপাদান উপকরণ প্রাচীন রাজপথগুলির ঐতিহ্যময় অতীতকে আজও স্মরণ করিয়ে দেয়। তাই সরেজমিনে ক্ষেত্রানুসন্ধান করলে বাংলার লুপ্তপ্রায় প্রাচীন রাজপথগুলি আজও খুঁজে পাওয়া সম্ভবপর হবে।

নৌকা : জীবনে ও শিল্পে

মৃণালকান্তি গায়োন

সুন্দরবন ব-দ্বীপ অঞ্চলের কাকদ্বীপ ব্লকে আমার জন্ম ও বড়ো হয়ে ওঠা। তাই নৌকা আমার কাছে আমার ভাষার চেয়েও বেশি পরিচিত। কারণ কথা বলতে শেখার আগে থেকেই এই নৌকা আমি দেখতে ও বুঝতে শিখেছি। আমার ছোটবেলায় যেমন খেলাঘরগুলি মধ্যে একটি। ছোটবেলায় যেমন কাগজের নৌকা করে ডাঙাকে জল ভেবে নৌকা ভাসিয়েছি, নারকেল গাছের ছোবড়াকে নৌকা বানিয়ে জলাশয়ে ভাসিয়েছি, তেমনি বড়ো হওয়ার পর নদীতে খেয়া পারাপারের জন্য নৌকার দাঁড় ও হাল ধরেছি। নদীর পাড়ে বসে দেখেছি জোয়ারের জল আসলে নদী ভরে যায়, কিছু গাছ ডুবে যায়, কিছু গাছের মাথা জল ছুঁছুঁই। আবার ভরা কোটালের সময় নদী বাঁধ প্রায় ডুবুডুবু। কোনও কোনও সময় বাঁধ ভেঙ্গে মাঠ, খेत, আবার ঘরের মধ্যেও জল ঢুকে পড়ে। ভাটায় আবার জল কমে যায়। গাছগুলো আস্তে আস্তে সদ্য জল থেকে বেরোচ্ছে। যেমন আমরা পুকুরের গায়ে লেগে থাকে ভালোবাসে, জোয়ার-ভাঁটা এই স্রোতে তারা কেউ কাউকে হারিয়ে যেতে দেয় না। যেন প্রীতির বন্ধনে আবদ্ধ। ওরা আনন্দে ঢেউয়ের সঙ্গে তালে তাল মিলিয়ে নাচে। দিন চলে যায় দিন আসে, ওদের খেলা চলতেই থাকে। এত দেখি তবু নৌকার রূপ আমার কাছে রহস্যময়ী ও বিস্ময়কর। ছোট্ট একখানি নৌকা কাঠের কয়েকটি ফালি দিয়ে তৈরি অথচ কত ঢেউয়ের ধাক্কা যে সময়, কত দেশ-দেশান্তরে তার পরিভ্রমণ, কত ঘাটে তার বাঁধা পড়া, কত সাগরের ঘূর্ণিতে তার আবর্তিত হওয়া, কত দুর্বিপাকের মধ্য থেকে উত্তীর্ণ হওয়ার অভিজ্ঞতা ওদের জানা। এই ঘাটে বাঁধা আবার কোথায় চলে যায় দূর-দূরান্তে, পুনরায় তাঁরা ঘাটে ফিরে আসে। কত জায়গার সুখ-দুঃখের কথা ও তাদের সংস্কৃতি জানে। এইভাবে নদী এবং নৌকার গভীর অবিকল্প অনুপ্রেরণা সঞ্চারিত হয় এবং জীবনের গভীর অনুভব ফিরে আসে। এ বিষয়ে বিভিন্ন বইপত্র থেকে তথ্য সংগ্রহ করেছি। কারিগরদের সঙ্গে প্রত্যক্ষ আলোচনা এবং নিজের পর্যবেক্ষণ থেকেই এই বিষয় নিয়ে কাজ করছি।

মানব সভ্যতার বিবর্তনের ইতিহাস ঐতিহাসিকদের মতে প্রায় ত্রিশ হাজার বৎসরেরও বেশি সময়কাল। বিবর্তনের এই দীর্ঘ পথে মানুষ করায়ত্ত করেছে তার প্রয়োজনের সমস্ত উপকরণ সামগ্রী। এই বিবর্তনের সাথে সাথে মানুষের জীবনযাপনের ধারারও ব্যাপক পরিবর্তন হয়েছে। এখন পরীক্ষা-নিরীক্ষা করে চলেছে নতুনের সন্ধানে। সেই অবিরত পরীক্ষা-নিরীক্ষার একটি বিষয় হল যানবাহন। সেই প্রয়াস কল্পেই আজ যানবাহনের নানারকম বৈচিত্র্যময় রূপ আমরা দেখতে পাই। সভ্যতার শুরুতেই দু-ধরণের যানবাহন দেখি। স্থলযান ও জলযান। স্থলযান শুধুমাত্র একটি ভূখণ্ডের বা দ্বীপের মধ্যে সীমাবদ্ধ। কিন্তু এক দ্বীপ থেকে অন্য দ্বীপে যেতে হলে চাই ভেলা। অর্থাৎ জলে ভাসমান কোন উপাদান। যেমন, শুকনো কাঠ, কিছু কিছু গাছের গুঁড়ি, যার উপর ভেসে পার হওয়া যায়। আস্তে আস্তে মানুষ তার ভেলার অভিজ্ঞতা থেকেই নৌকা আবিষ্কার করল। নৌকার সাহায্যে মানুষ দ্বীপ থেকে দ্বীপান্তরে যেতে পারল। ভারতের মেহেরগড় ও সিন্ধু সভ্যতার পূর্বে মানুষ যখন যাযাবর জীবনযাপন করত তখন ভাসমান বস্তুর সাহায্যে স্থানান্তরে যেত বলেই আমরা অনুমান করতে পারি। আমরা অতীতের দিকে তাকালে দেখতে পাই যে,

পৃথিবীতে আদিমতম সভ্যতাগুলি ছিল নদীমাতৃক। যেমন, মেসোপটেমিয়ার সভ্যতা (বর্তমান ইরাকে অবস্থিত টাইগ্রিস এবং ইউফ্রেটিস নদীর মধ্যবর্তী স্থানে অবস্থিত) এই সভ্যতা খ্রিস্টপূর্ব ৬০০০ বছর পূর্বের সভ্যতা। মিশরীয় সভ্যতাকে আমরা দেখতে পাই সেখানেও নীল নদ রয়েছে।

খ্রিস্টপূর্ব তৃতীয় শতকে অশোকের সময় সিংহলে যে বৌদ্ধধর্ম প্রচারের প্রয়াস হয়েছিল, (কিংবদন্তী যে, অশোকের ছেলে ও মেয়ে মহেন্দ্র ও সংঘমিত্রা'র সিংহল গমন) ভারত মহাসাগরে অর্থাৎ উপদ্বীপীয় ভারতে দক্ষিণে কিংবা কন্যা কুমারীর অন্তরীপের ও দক্ষিণে ভারতীয় নৌযানের চলাচল প্রমাণিত হয়।

এছাড়াও খ্রিষ্টীয় তৃতীয় শতাব্দীর সাঁচি ও ডারহুতের ভাস্কর্যে নৌকার উপস্থাপন দেখতে পাই (বর্তমানে সেটি ভারতীয় যাদুঘরে সংরক্ষিত আছে)। খ্রিস্টপূর্ব তৃতীয় শতকে আরও অনেক নিদর্শনের মধ্যে উল্লেখযোগ্য হল চন্দ্রকেতু গড়ে প্রাপ্ত একটি টেরাকোটা নৌকার উপস্থাপন দেখা যায়। সপ্তদশ শতকের শেষ ও অষ্টাদশ শতকের শুরুর দিকে মধ্যযুগের মুর্শিদাবাদে গজদন্ত শিল্পে ময়ূরপঙ্খীরূপ নাওয়ার প্রতিফলন দেখতে পাই। এইভাবে নৌকাকে ঘিরে আমাদের সুকুমার কলা নির্মাণে ও সংস্কৃতি আজকের নয়। সেই প্রাচীনকাল থেকেই চলে আসছে। বাজালির অনেক উৎসব আছে যেখানে নৌকা অঙ্গঙ্গীভাবে জড়িত।

বাঁকুড়ার লোক উৎসব টুসু পুজোতে নৌকাতেই প্রদীপ সাজানো হয়। বাজালির চিরাচরিত লক্ষ্মীদেবীর পূজাতেও কলাগাছের ছালকে নৌকারূপেই ভাসানো হয়ে থাকে। অর্থাৎ রিচুয়ালসে মাধ্যমে নৌকার প্রতীকায়ন।

মানব জীবন নৌকার ব্যবহার বা জলযানের ব্যবহারের অনেকগুলি বৈশিষ্ট্য দেখা যায়। যেমন দরিদ্রের অবলম্বন একখানি ডিঙা, (যেমন, বাংলা ভাষার ধ্রুপদী উপন্যাস “পদ্মানদীর মাঝি” মৎসজীবী জেলের ডিঙি নৌকা, বা পারাপারের খেয়া নৌকা) তেমনি, সামন্ত প্রভুর বজরা “দেবী চৌধুরাণী” উপন্যাস এই বজরার উল্লেখ আছে। সপ্তডিঙা মধুকর (মনসামঙ্গল কাব্যে উল্লিখিত) প্রভৃতি প্রাসঙ্গিক ক্ষেত্রে অপরিহার্য উপাদান রূপে ব্যবহৃত হয়ে চলেছে শতাব্দীর পর শতাব্দী। নৌকা মানব জীবনের রূপ কাঠে ‘জীবন তরণী’ রূপে প্রতিবিম্বিত হয়ে ওঠে আমাদের শিল্পে ও সাহিত্যে।

পৃথিবীর বৃহত্তম নদী গঠিত ব-দ্বীপ অঞ্চল সুন্দরবন দূরদর্শন মাধ্যমে ‘ন্যাশনাল জিওগ্রাফিক’ বা ‘ডিসকভারি চ্যানেল’-এর দৌলতে বিশ্বের পরিবেশ সচেতন কোন মানুষের কাছে আজ আর অজানা নয়। সৌদামাটির জালের মতো বিছানো নদীপথ ও ম্যানগ্রোভ অরণ্যের আলো-আধারি বিস্তীর্ণ। কোথাও কোথাও সবুজ গালিচা বা কার্পেট পেতে রাখার মতো দেখায়। এইসব জায়গার নদীনালা দ্বীপগুলি ছোট-বড় সব মিলিয়ে। যেমন, মেঝেতে কাচের গ্লাস ভেঙ্গে টুকরো টুকরো হয়ে যায়। বড়, ছোট আরও ছোট এইভাবে দ্বীপগুলি সমন্বয়। মানুষের যাতায়াতের বা বসবাসের পক্ষে খুবই দুর্গম অঞ্চল। বেশিরভাগ দ্বীপে মানুষের বসবাস নেই। বিশেষত রয়েল বেঙ্গল টাইগারের বিচরণভূমি। এছাড়া কুমীর, বিষধর সাপ ও পোকামাকড় দেখা যায়। মানুষ জীবিকার জন্য মধু সংগ্রহ, কাঠ সংগ্রহ ও মৎস্য শিকারের উপর বেশি নির্ভরশীল। এই মৎস্য শিকারী এবং মধু সংগ্রহকারীদের উপর জলদস্যুদের আক্রমণ ছিল, আজও আছে। কথিত আছে; কিংবদন্তী রাজা দক্ষিণ রায়ের নেতৃত্বে জলদস্যুদের হাত থেকে সুন্দরবন রক্ষিত হয়েছিল।

এই ব-দ্বীপ অঞ্চলের প্রধান নদী ও শাখানদী, খাল, খাঁড়ি আছে। এখানকার প্রধান প্রধান নদীগুলি হল বয়মঙ্গল, ইচ্ছামতি, হাতানিয়া-দোয়ানিয়া, কালনাগিনী, কংসাবতী, বিদ্যাবতী, মাতলা প্রভৃতি। এই নদীগুলিতে জোয়ার-ভাটা খেলে। এই নদীগুলি লবণাক্ত। লবণাক্ত হওয়ার কারণে সুন্দরবনের অরণ্যের বৈচিত্র্য দেখা যায়। এখানে সুন্দরী, গরান, গর্জন, গৌয়া, ক্যাওড়া, হেঁতাল, গোল এছাড়াও বিভিন্ন ধরনের কাঁটায়ুক্ত গাছ দেখা যায়।

পূজা-পার্বণেও আমরা লক্ষ্য করি জীবিকা, জীবন যাপনের উপর নির্ভর করে দেব-দেবীর আরাধনা। দক্ষিণ রায়, বনবিধি তেমনি বিষধর সাপের হাত থেকে বাঁচার জন্য মনসাদেবীকে পূজা করেন। এছাড়া চাষবাসের আরাধ্যদেবী লক্ষ্মীর পূজা প্রতিটি বাড়িতেই হয়। পান চাষের কারণে বিন্দুবাসিনী পূজা হয়। একে ঘিরে তার লোক সংস্কৃতি গাজন, গান, যাত্রা, কবির লড়াই প্রভৃতি দেখা যায়। যেহেতু সুন্দরবন ব-দ্বীপ অঞ্চল সেই কারণে যাতায়াতের জন্য নদী, খাঁড়ি প্রভৃতি পার হয়ে যেতে হয়। সেখানে নৌকা ছাড়া কোন বিকল্প যান নেই। মানুষের প্রাথমিক চাহিদা, খাওয়া-পরা ছাড়া হাসপাতাল, স্কুল, কলেজ, পোস্ট অফিসের মতো গুরুত্বপূর্ণ জায়গায় যেতে হলে নৌকার সাহায্য ছাড়া উপায় থাকে না।

নৌকার রূপ ও বৈচিত্র্য

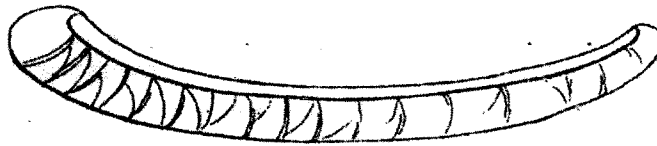
দেশ, কাল, প্রকৃতি এবং উপযোগিতা অনুসারে এক এক অঞ্চলে নৌকার একেক রূপ দেখা যায়। সময়ের পরিবর্তনের সাথে যেমন অভিজ্ঞতা অনুসারে তেমনি এবং প্রযুক্তির প্রয়োজনে ও হাল দাঁড় ও পালের ব্যবহার ও শেষমেশ যন্ত্রের ব্যবহারের ফলে নৌকার রূপগত পরিবর্তন ঘটেছে অনেকাংশ।



তিথি অনুযায়ী চাঁদের
বিভিন্ন রূপ-বৈচিত্র্য

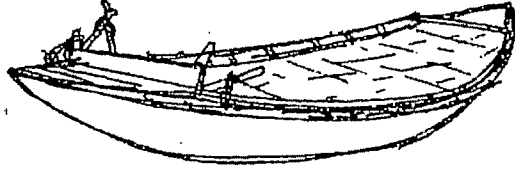


আমরা নৌকা রূপের সাথে চাঁদের বিভিন্ন কলার আকৃতির সাদৃশ্য দেখতে পাই। তিথি অনুযায়ী চাঁদের বিভিন্ন কলার রূপ - বৈচিত্র্য লক্ষ্য করা যায়। নৌকার রূপ - বৈচিত্র্যের সাথে বিভিন্ন তিথিতে চাঁদের যে রূপের পরিবর্তন হয় যথা, একাদশীর চাঁদ এক সরু ফালি ঠিক তখন জেলে নৌকার মতো দেখায়। আস্তে আস্তে চাঁদ পঞ্চমীর তিথিতে গিয়ে আর একটু চওড়া তখন খেয়া পারপারের নৌকার মতো। এইভাবে চাঁদের রূপের পরিবর্তন হয় সুন্দরবনের ব্যবহারিক উপযোগিতা অনুসারে আমরা অনেক রকম নৌকা রূপায়ন লক্ষ্য করি। যেমন, (১) ডোঙ্গা নৌকা (তাল গাছের তৈরি), (২) পাউখা নৌকা, (৩) খেয়া নৌকা, (৪) জেলে ডিঙ্গি, (৫) মালবাহী নৌকা, (৬) পেনিস নৌকা, (৭) বাইচ নৌকা, (৮) যন্ত্রচালিত নৌকা।



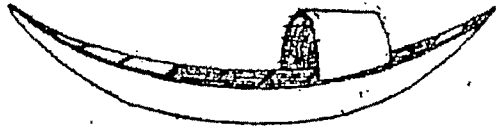
ডোঙ্গা নৌকা

(ক) ডোঙ্গা নৌকা : একটি তাল গাছের থেকে হয়। কোনও কাঠের চাওড়া তক্তা দেওয়া হয় না। এটি সাধারণত নিচু খেত জমিতে ঘাস কাটা, মাছ ধরা প্রভৃতি কাজে ব্যবহৃত হয়।



খোয়া নৌকা

(খ) খোয়া নৌকা : এই নৌকায় বসার জন্য পাটাতনের ছাউনি অবশ্যই থাকে। এছাড়াও সামাজিক প্রয়োজনীয়তা গুরুত্বের উপর নির্ভর করে ছোট বড় করা ও এর ডালি, ওভারডেক প্রভৃতি অংশগুলি সংযোজিত হয়।

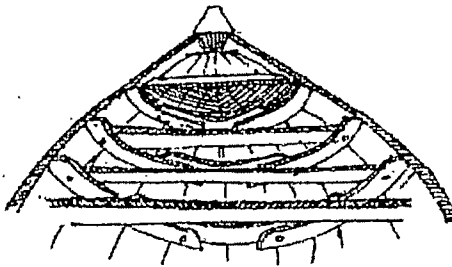


জেলে নৌকা

(গ) জেলে নৌকা : এই নৌকার মাথা ও পশ্চাৎ খুবই সূচালো হয়। দেখতে অনেকটা একাদশীর চাঁদের মতো। এই নৌকার হাল ও দাঁড় থাকে। এই নৌকার নির্দিষ্ট পাল থাকে না, কিন্তু প্রয়োজনে জেলেনীর কাপড় বা বেড শিট কখনো বড় গামছা বা পলিখিন অস্থায়ী ভিত্তিতে টাঙ্গিয়ে পাল হিসেবে ব্যবহার করে।

নৌকার গড়ন ও রূপায়ন

সুন্দরবন অঞ্চলে ব্যবহৃত নৌকাগুলির মধ্যে আকৃতিগত দিক থেকে পার্থক্য থাকলেও করণ কৌশল অথবা গড়নের কারিগরী কৌশল প্রায় একই রকম। প্রকৃতিতে যেমন আর পাঁচটা প্রাণীর মাথা, খড় প্রভৃতি আছে। তেমনি নৌকারও মাথায় খড় প্রভৃতি আছে। নৌকার মাথাকে বলা হয় চন্ডী। এই চন্ডী প্রথমে দাঁড় করানো হয়। তারপর নিচের অংশের দিকে একটি কাঠ জোড়া হয় পশ্চাৎ পর্যন্ত। এরপর নিচের থেকে শুরু হয় কাঠের তক্তা জোড়া দেওয়ার কাজ। দুটো তক্তার মাঝে খাঁজ কাটতে হয়। এই রাবিট কাটার পর দুটো তক্তারে পেরেক বা জুলি (এক ধরনের পেরেক দুই দিকে সূচালো) দিয়ে আটকানো হয়। দুটো তক্তার মাঝখান দিয়ে যাতে জল না ঢুকতে পারে তার জন্য এই মাঝখানে তুলো বা মোটা সুতো বাটালির সাহায্যে ঢোকানো হয়। এই পদ্ধতিতে 'গাওনি' বলে। কাঠের তক্তা এইভাবে জুড়ে জুড়ে নৌকার খোল তৈরি করা হয়। এই খোলের কাঠামো ঠিক বা শক্ত করার জন্য ভেতরে 'বাঁক' এবং 'বরাস' দিতে হয়।



বাঁক বরাস ও গুড়ার গঠন কিন্যাস



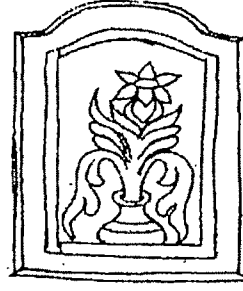
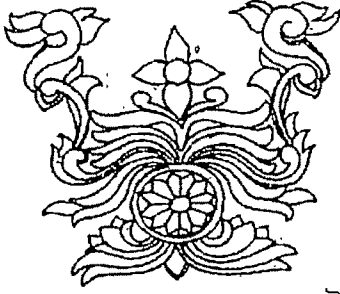
মাল ঝুটি

যেগুলো খেলের নিচে থাকে তাকে 'বাঁক' ও যেগুলো একটু উপরে দুপাশে থাকে সেগুলোকে 'বরাস' বলা হয়। এই নৌকা শেপ যেভাবে হবে তজ্ঞা সেইভাবে বাঁকানোর জন্য একটু আগুনে গরম করে দড়ি দিয়ে টান টান করে বেঁধে রাখতে হয়। এই বরাস ও বাঁক বাবলা কাঠ দিয়ে তৈরি হয়। নৌকার খোল তৈরি হওয়ার পর তার উপর ছাউনি হয়। ছাউনির দুপাশে ডালি লাগানো হয়। এই ডালি নৌকার শ্রীবৃদ্ধি করে। চন্ডী ও পশ্চাতে ডালির শেষ প্রান্তে দুটি কখনো একটি করে খুঁটি লাগানো হয় একে মালখুঁটি বলে। এই মালখুঁটিতে নৌকার কাছি (রশ্মি) বাঁধা থাকে। নৌকার ব্যবহার উপযোগিতা অনুযায়ী নৌকার মাঝামাঝি অংশ 'ঘর' বা 'কেবিন' বানানো হয়। এই ঘর সাধারণত বাঁশের বাতা দিয়ে তৈরি হয় যা তালপাতা ত্রিপল প্রভৃতি দিয়ে ছাউনি করা হয়। এরপর নৌকার খোল ও যে অংশ জলে ডুবে থাকে সেই পর্যন্ত আলকাতরা লাগানো হয়। যাতে নোনা জলে সহজেই নষ্ট না হয়। বাকি অংশে বং করে সুন্দর করে তোলা হয়। এইভাবে নৌকা তৈরির পর্ব বা গড়ন পদ্ধতি শেষ হয়।

নামখানার কারিগর কার্তিক দাস জানালেন যে, ১৫ বছর বয়স থেকে তিনি বাবার সঙ্গে কাজ করছেন। এই নৌকা নিজে তৈরি করছেন তাঁর বংশ পরম্পরার পেশা হিসাবে। তবুও তিনি এই পরিণত বয়সে নৌকার গড়ন বৈচিত্র্য নিয়ে খুবই উদ্বিগ্ন থাকেন। এবং আরও নিখুঁত করে গড়ে তোলার আগ্রহে মনোনিবেশ করেন। তিনি আরও জানালেন, তাঁর আনন্দ এই যে, তিনি যে সমস্ত জায়গার যেতে পারেননি তাঁর হাতে গড়া নৌকা কিন্তু সেই সমস্ত জায়গার পৌঁছে গিয়েছে। তিনি একদিন এই পৃথিবী থেকে চলে গেলেও, তাঁর হাতে গড়া নৌকা এই বিশ্বে থেকে যাবে।

নৌকার দৃশ্যরূপ

প্রয়োজনের সুবিধার্থে নৌকার আকার আকৃতির তারতম্য হয়। সব নৌকা একই কাজে ব্যবহৃত হয় না। তাই নৌকার আকৃতি ব্যবহার উপযোগী করার ফলে নৌকার রূপও বৈচিত্র্য ঘটে। নৌকার রূপ পুরোটাই একটি ত্রিমাত্রিক ফর্ম। এই নৌকা জলে থাকলে দেখতে এক রকম হয়। আবার ডাঙায় তুললে আর এক রকম হয়। সব নৌকার গড়নে আলোছায়া খেলে। এছাড়া যখন জলে থাকে তার পরিবেশের সঙ্গে সৌন্দর্য অন্যরকমভাবে দেখা দেয়। নৌকার জলে থাকা অংশ কালো রং, ডালিতে সাদা, নীল, লাল, হলুদ এবং নীল আকাশের বৃকে বিভিন্ন রংয়ের পাল তুলে মাঝে একটু জঙ্গলের সবুজ আভাস এই নান্দনিক সৌন্দর্য নদীপথের একটি মৌলিক দৃশ্য। সময়ের পরিবর্তনের সঙ্গে সঙ্গে প্রয়োজনের নিরিখে নৌকার গড়ন ও রূপের পরিবর্তন লক্ষ্য করা যায়। নৌকা তৈরির সময় নৌকাতে বাঁক ও বরাস দেওয়া হয়। প্রকৃতিতে মানুষ এবং আর পাঁচটা জীবজন্তুর দেহে যেমন পাঁজর থাকে বাইরের আঘাত সহ্য করার জন্য তেমনি নৌকারও নদীর উত্তাল স্রোতের ধাক্কা সহ্য করার জন্য বাঁক ও বরাস থাকে। মানুষের শরীরে যেমন ছোট বড় হাড় সাজানো থাকে ঠিক নৌকার তেমনি ছোট বড় বাঁক ও বরাস সাজানো থাকে। এই ছোট বড় বাঁক ও বরাসের আলোছায়া দেখে মনে হয় যেন ছোট বড় সরু মোটা লাইন দিয়ে নকশা তৈরি হয়েছে। এই নকশাগুলি খুবই গতিশীল বলে মনে হয়। নৌকার বাইরের গড়নে বিভিন্ন অংশে নকশার বৈচিত্র্য দেখা যায়। নৌকার দুই পাশের ডালিতে ফুল লতা পাতার নকশা কোথাও কোথাও মাস্টিক চিহ্ন সারি সারি শঙ্খের নকশা কোথাও বা ময়ূর, হাঁস, হাতি।



নৌকায় ব্যবহৃত নক্সা

এছাড়াও গঙ্গাদেবীর বাহন কাল্পনিক প্রাণী ‘মকরের’ অলংকরণ দেখা যায়। নকশাগুলি বাটালির সাহায্যে খোদাই করা হয়। নকশাগুলি সবই প্রায় ‘রিলিফে’ (নতোন্নত) করা হয়। এছাড়াও কিছু ছোট ছোট জায়গায় যেমন নৌকার ‘মালখুটির’ চারিপাশে ফুলের নকশা দেখতে পাওয়া যায়। এছাড়া এই মালখুটিকে একটি ফুলের ন্যায় তৈরি করা হয়। নৌকার মাথার দুপাশে নৌকার ডালিতে দৃষ্টি আকর্ষণের জন্য খোদাই করা নকশা ছাড়াও রং লাগানো হয়। এছাড়াও নৌকার মাথার দুপাশে চোখ খোদাই করা এবং রং দিয়ে চোখ আঁকার প্রথা আছে। কোন কোন নৌকার ডালিতে কখনো বা দাঁতের ন্যায় নকশা খোদাই করা থাকে। মালবাহী নৌকার মাস্তলের উপর ফুল লতাপাতা প্রভৃতির নকশা দেখতে পাই। বাইচ নৌকার চতী অর্থাৎ মাথাতে হাঁস, ময়ূর, পশুপাখি প্রভৃতির মাথার সাথে সামঞ্জস্যপূর্ণ নকশা দেখা যায়। এ ধরনের নৌকা ময়ূরপক্ষী নামে মানুষের কাছে পরিচিত। এই নৌকার সামনের দিক অর্থাৎ মাথা অনেকটাই উঁচু তুলনামূলকভাবে পশ্চাৎ নিচু দেখে যেন মনে হয় ময়ূর বা হাঁস তীর গতিতে উড়ে চলেছে।

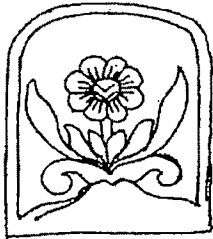


ঈগল পাখির নকশা



মকর নকশা

নৌকার উপর প্রয়োজনানুযায়ী ঘর বানানো হয়ে থাকে। বিভিন্ন নৌকার ঘর আলাদা আলাদা রকমের হয়। খড়ের ঘর হলে খড়কে সুন্দর বুননের দ্বারা দৃষ্টিনন্দন করে তোলে। কাঠের ঘর হলে - ঘরের মতো দরজা জানালা থাকে। সেই দরজা জানালাতে ফুল, লতাপাতা, ফুলদানিতে ফুলের তোড়া প্রভৃতির নকশা দেখতে পাই। নৌকার



নৌকায় ব্যবহৃত বিভিন্ন নকশা

যেমন বিভিন্ন গড়নের প্যাটার্ন রয়েছে, তেমনি বিভিন্ন নৌকার হালের মধ্যেও বৈচিত্র্য দেখা যায়। নৌকার হাল ব্যবহারের প্রয়োজনে চামচ, হাতা, ছুরি এবং দরজা জানালার পাল্লার মতো দেখতে পাই। যেমন পাউখার ক্ষেত্রে হাল ও দাঁড় একটিই। এটি একটি তক্তা দিয়েই তৈরি হয়। এক প্রান্ত চওড়া এবং হাতলের দিকে ক্রমশ সরু হয়ে দেখতে অনেকটা চামচের মতো। খেয়ানৌকার হালের লম্বা কাঠের সঙ্গে যে অংশ জলের দিকে থাকে সেই নিচের অংশে দুধারে দুটো সমান মাপের চাওড়া তক্তা থাকে। যা দেখতে রান্না করার হাতার মতো এবং এর উপরের দিকে হাতল থাকে। এই হাতলেও ফুলের নকশা দেখা যায়। জেলে নৌকার হালের নিচের অংশের তক্তা অর্থাৎ হালের পাতা একটি বাঁশের হাতলের সঙ্গে সুন্দরভাবে বাঁকা থাকে। এই হাল দেখতে হয় কিছুটা ছুরির মতো। অন্যদিকে মালবাহী নৌকার হাল অন্য সকল নৌকার থেকে সম্পূর্ণ আলাদা রকমের হয়। এই হালের যে অংশ জলে ডুবে থাকে সেটি অনেকটা চওড়া থাকে। নিচের দিকের এই চাওড়া অংশটি দেখতে অনেকটা জানালা দরজার পাল্লার মতো। এটি কাঠের হয় এবং নৌকার হালটি সব সময়ের জন্য ঐ নির্দিষ্ট জায়গায় জানালার মতো হাঁসকল অথবা কবজা দ্বারা আটকানো থাকে। যন্ত্রচালিত নৌকার হাল মালবাহী নৌকার মতো দেখতে তবে এটি কাঠের হয় না, পুরোটাই লোহার তৈরি হয়। একে সুগাম বলা হয়।

নৌকাতে খোদাই ছাড়াও কমবেশি সব নৌকাতেই রং-এর কাজ দেখা যায়। নৌকার ‘চভী’ বা মাথাতে সিঁদুরের উজ্জ্বল লাল বং বিশেষ দৈবিক শুভত্ব চিহ্নিত করে চভী ছাড়াও সিঁদুর নিয়ে নৌকার বিভিন্ন অংশ ও স্বস্তিক প্রভৃতি চিহ্ন আঁকা হয়। নৌকার আঁকা চোখ নৌকাকে নদীপথে সঠিক দিক নির্ণয় করে নিয়ে যায়। অনেক নৌকাতে দেখা যায় ঈগল পাখির ছোঁ মেরে মাছ ধরে নিয়ে তীরের বেগে উড়ে যাওয়ার ছবি। রং, রেখা আঙ্গিক বাস্তবসম্মত রীতির বা শৈলীর এই সব ছবির বা অলংকরণে বিষয়গুলি মাঝরা তাদের নিজেদের জীবন ও জীবিকার সঙ্গে সম্পৃক্ত বিষয়ের পরিপ্রেক্ষিতে নির্বাচন করে থাকেন। যেমন - ঈগল পাখি তার তীক্ষ্ণ দৃষ্টি, বলিষ্ঠ ক্ষমতার দ্বারা সুনিপুনভাবে মৎস্য শিকার করার অনুভব করেন। চলমান প্রকৃতির দৃশ্যরূপ থেকেই এই শিল্পের উপকরণ বা আহরণ করা হয়। এছাড়া সুন্দরবনের যোহেতু বাঘ ও হরিণ প্রভৃতি জন্তু দেখা যায় তাই এই অঞ্চলের নৌকাগুলিতে হরিণের পালের ছুটে চলা এবং বাঘের রাজকীয় ও ভয়ঙ্কর ভাবমূর্তির ছবিও আঁকা দেখতে পাই।

নৌকা তৈরির সময় ডাঙ্গাতে যেভাবে তার রূপ ও গড়ন দেখতে পাই নৌকা জলে ভাসার পর এর রূপ আলাদা হয়ে যায়। নৌকার বেশিরভাগ অংশই জলের মধ্যেই ডুবে থাকে। নৌকার এই জলের মধ্যে ডুবে থাকা, জলে নৌকার প্রতিচ্ছবি, উপরে নীল আকাশ এবং পশ্চাৎপটে সবুজ বর্ণালী মিশে এক দৃষ্টিনন্দন দৃশ্যপট তৈরি হয়। নৌকার গড়নের লম্বা দিকটি যেমন চোখে পড়ে উচ্চতা সেইভাবে চোখে পড়ে না কিন্তু পাল তোলা নৌকার আমরা তার পালের জন্য মনুমেন্টাল কোয়ালিটি সম্পন্ন হিসেবে প্রত্যক্ষ করি। বিভিন্ন নৌকার বিভিন্ন বং-এর পাল থাকে। কোনও কোনও নৌকার পালে অ্যাপলিক-এর কাজ করা থাকে। আবার যে সকল নৌকার পাল ছিঁড়ে যায় তাতে জোড়াতালি দেওয়ার ফলে দূর থেকে সেটাও অ্যাপলিকের কাজ বলে মনে হয়। সারি সারি পাল তোলা নৌকা যখন একসঙ্গে যায় তখন এক অপূর্ব দৃষ্টিনন্দন রূপ আমরা দেখতে পাই। নদী জলে প্রতিফলিত এবং স্থল ও জল রেখায় বিভাজনহীন এক সামগ্রিক দৃশ্যপটে নৌকায় এক চিরন্তন কালের অভিযাত্রী নাবিক। সাগর পাড়ি দেওয়ার আগে স্থির বিশ্রামের কয়েকটি অঞ্চল মুহূর্ত।

নৌকা ও সংস্কৃতি

পশ্চিমবঙ্গের নানা প্রান্তে নানা প্রকার সাংস্কৃতিক পরিমন্ডল গড়ে উঠেছে যার মধ্যে দক্ষিণবঙ্গ বিশেষত সুন্দরবন অঞ্চলটি বৈশিষ্ট্যের দাবি রাখে। সুন্দরবন অঞ্চলের ইতিহাস সুপ্রাচীন। ভূতত্ত্ব, পুরাতত্ত্ব, নৃবিজ্ঞান, লোকসংস্কৃতি বিজ্ঞান, সমাজবিজ্ঞান প্রভৃতি আছে। এই সংস্কৃতিগুলির মধ্যে বেশ কিছু নৌকা ও জনজীবনের সঙ্গে ওতপ্রোতভাবে

জড়িত। নৌকাকে ঘিরে এই অঞ্চলের লৌকিক দেব-দেবীর পূজাচার, সংশ্লিষ্ট বিশ্বাস, সংস্কার এবং অ্যাখ্যামূলক লোকায়ত পালাগানের সুবিপুল ঐতিহ্য আছে।

নৌকা তৈরির সময় দিনক্ষন দেখে নৌকা তৈরি শুরু করতে হয়। নৌকার বাবা-মা অর্থাৎ মালিক একজন থাকে। এই মালিকের রাশি অনুযায়ী নৌকা তৈরির দিনক্ষন ঠিক করা হয়। এরপর কারিগরকে নতুন বস্ত্র পরিধান করে যে কাঠটিতে নৌকার 'চভী' অর্থাৎ মাথা তৈরি হয় সেই কাঠটিকে পূজো করা হয়। এই চভীর কাঠটি একটি কাঠের কাণ্ড থেকেই তৈরি হয়। লোকসমাজে কথিত আছে যে নৌকার মাথাতে যদি আলাদা কাঠ জোড়া দেওয়া হয় তাহলে সেটা খুঁতযুক্ত হয়ে পড়ে। নানা রকমের সংস্কারের সঙ্গে সঙ্গে এও মনে করা হয় যে পরবর্তী কালে নৌকার এই খুঁতের জন্য নৌকার দেবী নৌকার এই মালিককে নানারকম অসুবিধায় ফেলে দেবেন। যেমন নৌকা ডুবে যাওয়া, মাছ ধরতে না পারা, অর্থনৈতিক ক্ষতি হওয়া প্রভৃতি। এক কথায় নৌকাদেবী মালিকের সহায় হয় না। নৌকা তৈরির সময় এখানে কারিগর শিল্পশ্রষ্টা দেব বিশ্বকর্মা কেই ধ্যান করেন। বিশ্বকর্মার বাহন হাতির উপর রাজকীয়ভাবে বসে থাকেন। নৌকা তৈরির সময় কারিগরেরা নৌকাকে দেবী হিসেবেও ধারণা করেন। এই কারণে কারিগররা নিষ্ঠা সহকারে পোশাক পরিবর্তন করে, জুতো খুলে নৌকার উপর ওঠেন। নৌকার গড়ন, নকশা এবং রং লাগানো শেষ হওয়ার পর কারিগর নৌকাকে মালিকের হাতে সমর্পণ করেন। নৌকা মালিকের হাতে তুলে দেওয়ার সময় মালিক কারিগরকে নতুন বস্ত্র পরিধান করায় ও দক্ষিণা দিয়ে সম্ভ্রষ্ট করান এবং একটি পিতলের কলসিতে দুধ ভর্তি করে কারিগরের হাতে দেন। কারিগর দুধভর্তি কলসি নিয়ে নৌকার চভীতে দুধ ঢেলে নৌকাকে স্নান করান। অবশেষে নৌকা জলে ভাসানো হয়। এই জলে ভাসানোর সময় চিরাচরিত প্রথায় গঙ্গাদেবী বসে থাকে, দেবীর চারটি হাত, তাঁর এক হাতে পদ্ম, এক হাতে শঙ্খ এবং আর এক হাতে আর্শীবাদ করছেন প্রদায়িণী রূপে বিস্থিত।

যে নৌকাগুলির সাহায্যে মানুষ জঙ্গলে মধু সংগ্রহ এবং কাঠ কাটার জন্য যায় তারা বনের দেবী লৌকিক দেবী বনবিবির পূজা করে থাকেন। তিনি তার বাহন বাঘের উপর বসে থাকেন। এছাড়াও কখনও কখনও তার বাহন মোরগের উপরও বসে থাকেন। কোলে একটি শিশু থাকে। এছাড়াও জলদস্যুদের আক্রমণের ভয় শরণাপন্ন হয় রাজা দক্ষিণ রায়ের। নৌকাকে ঘিরে এই লোকসংস্কৃতির বৈচিত্র্যময় মিলন মেলা দেখা যায়। এই সমস্ত দেবদেবী শুধু নৌকাতে পূজিত হন না লোকালয়েও বছরে বিশেষ তিথিতে আড়ম্বরের সঙ্গে পূজিত হন। এই পূজাকে কেন্দ্র করে মেলা বসে। এই মেলায় বিভিন্ন জীবিকার মানুষ তাদের জীবিকার সত্তার তুলে ধরেন ও ভাব বিনিময় করেন। কারিগর যেমন নৌকা গড়েন, শিল্পী যেমন নকশা খোদাই করেন, রং দিয়ে নকশা আঁকেন তেমনই নৌকার এই মেলাকে কেন্দ্র করে সাংস্কৃতিক অনুষ্ঠান, লোকগীতি, যাত্রা, লোকনৃত্য প্রভৃতি অনুষ্ঠিত হয়। এই সমস্ত দেবদেবীর পূজো মেলা সংস্কৃতি এখানকার মানুষের জীবনের সঙ্গে জড়িয়েই এই মৎস্যজীবী ও অন্যান্যদের লোকায়ত জীবনচর্চার মিশ্র সাংস্কৃতিক রূপ তুলে ধরে।

প্রয়োজন ও পরিস্থিতির ভিত্তিতেই অঞ্চল ভেদেও এমনকি একই অঞ্চলে নৌকার গড়নের মধ্যে বৈচিত্র্য লক্ষ্য করা যায়। জৈবিক সত্তার বাইরে মানুষের যে অস্তিত্ব, মানব সম্পদ বা ভাবসম্পদকে অবলম্বন করে যায় প্রকাশ ঘটে তারই তাগিদে মানুষের ব্যবহারিক উপকরণ ও শ্রীমণ্ডিত হয়ে উঠেছে। এই ভাবেই বিভিন্ন সভ্যতার গড়ে উঠেছে তার বস্তু সংস্কৃতির সত্তার। জীবন ধারণের প্রয়োজনের যেমন নানারকম জীবিকার তৈরি হয়েছে। তেমনই এই সব জীবিকা নির্ভর মানুষ প্রযুক্তি ও কৌশলের সঙ্গে শিল্পকে যুক্ত করে সাজিয়ে তুলেছে তার উৎপাদনের বৈচিত্র্য ও ভিন্নতা। এইভাবে সৃজনশীলতার আবেগ ছাপিয়ে গিয়ে কাঠ কুটো কাদা মাটির উপকরণকে শিল্প মাধ্যমে রূপদান করেছে। নৌকার সঙ্গে কারু ও শ্রী-র সংযোজনে যুক্ত থাকেন দুটি জীবিকার মানুষ-কারিগর, যিনি নৌকা তৈরি

করেন এবং যাঁরা এই ব্যবহার করেন। যে কারিগর নৌকা তৈরি করেন তিনি যেন সৃষ্টির আনন্দে মেতে থাকেন। ক্ষেত্র সমীক্ষার অধ্যয়ণ থেকে দেখেছি যে এই নৌকা তৈরির জীবিকাতে পারিশ্রমিকের অর্থ অনেক কম হলেও তারা অন্য জীবিকার সঙ্গে নিজেদের জড়াতে চান না, ভাগতে চান না, নৌকার সঙ্গে আবাল্য গড়ে ওঠার সম্পর্ক। যেন বস্তুগত এই মাধ্যমটি আর প্রাণ লক্ষ্যহীন শুধু কাঠের একটি জ্যামিতিক অবয়ব মাত্রই নয়, সেটি যেন একটি সজীব সত্তা। অতি অল্পে তুষ্ট এই শ্রমজীবী মানুষের প্রকৃতির কাদা-জল জঙ্গল আকাশ মেঘ রৌদ্রর আশ্রয় নিয়েই পুনরায় জীবনের ছন্দে কর্মের চাঞ্চল্য ফিরে পায়। অল্পতুষ্টি ও দার্শনিকতার ভাবনা থেকেই মাঝি ভাসতে ভাসতে হাল ধরে, হাস ধরতে ধরতে, দাঁড় টানতে টানতে গান গেয়ে ওঠে। সে তখন নাবিক, অভিযাত্রী রসের কারবারী, শিল্পী ও দার্শনিক - মাঝির একমাত্র সঙ্গী সহচর হৈত সত্তা পায়। সেইখান থেকেই নৌকার রূপ ও সৃজনে, শ্রী ও সৌন্দর্যে সমন্বয় ভাবনা জেগে ওঠে। বংশ পরম্পরায় এভাবেই বয়ে চলে জীবিকা ও জীবনদর্শন। নৌকার কারিগর যেমন তাঁর হাতের কৌশলে কাজকে শিল্প করে তোলেন, তেমন আনন্দেই মাঝি নৌকাকে প্রাণবান সজীব করে তোলেন।

মানভূমের প্রাচীন ইতিহাস ও সংস্কৃতি : প্রত্নতত্ত্বের আলোকে

রামু কুমার দাস

পুরুলিয়া জেলার পূর্ব নাম মানভূম। পুরুলিয়া জেলায় ও সংলগ্ন অঞ্চলে ‘মান’ নামাঙ্কিত একাধিক স্থান ও জনগোষ্ঠী নির্দেশ করে এক সময় প্রাচীন ও সম্ভ্রান্ত ‘মান’ গোষ্ঠীর আবাস ছিল মানভূম। তারা কোথা থেকে এসেছিল, কতদিন এ অঞ্চলে আধিপত্য করেছিল, পরবর্তীকালে কোন কোন অঞ্চলে ছড়িয়ে পড়েছিল, সে বিষয়ে সুস্পষ্ট সূত্র পাওয়া যায় না। গবেষক মনে করেছেন, এখনও এ বিষয়ে গবেষণা হওয়া প্রয়োজন। কোন কোন ঐতিহাসিক অনুমান করেছেন ‘মান’ একটি রাজবংশের নাম। রাজবংশটি একসময়, মানভূম, সিংহম ও তৎসংলগ্ন উড়িষ্যা অঞ্চলে রাজত্ব করতেন। তাদের নাম অনুসারেই এই অঞ্চলের নাম হয়েছিল মানভূম। (Studies in the Geography of Ancient and Medieval India; Dr. D. C. Sircar, 1960).

বীরভূম, বাঁকুড়া, মেদিনীপুর ও পুরুলিয়া জেলায় মান আধিপত্যের নানা চিহ্ন আজও লক্ষ্য করা যায়। প্রকৃতপক্ষে মান নাম, মান জাতি ও তাদের উৎপত্তি ক্ষেত্র সম্বন্ধে ঐতিহাসিকদের মধ্যে এখনও মতভেদ রয়েছে। অধ্যাপক মিরশি অনুমান করেছিলেন, মান পদবী যুক্ত রাজারা ছিলেন রাষ্ট্রকূট রাজবংশের একটি শাখা। এদের আদি পুরুষ ছিলেন ‘মানাক্ষ’। তাদের তিনটি তাম্রপট্ট আবিষ্কৃত হয়েছে। তাম্রপট্টগুলো হল : (i) Undikavaliks grant-JBBRAS, vol XVI, (ii) Pāndurangpalli Plate - Mysore A.R. 1929, (iii) Gokak Plate - E. 1, vol XXI.

হাজারীবাগ জেলার দুধপানি পাহাড়। পাহাড়ের গায়ে সংস্কৃত পদ্যে একটি লিপি খোদাই করা আছে। এই ‘Dudhpani Rock Inscription of Udyamana’ থেকে জানা যায় চারশো বছর পরেও ‘মান’ বংশের বিলুপ্তি ঘটেনি। আর একটি পাথরের লিপিতে তার প্রমাণ পাওয়া যায়। সেটি পাওয়া গিয়েছিল গয়া জেলার গোবিন্দপুর গ্রামে। Sir Alexandar Cunningham এই লিপিটির রাবিং সংগ্রহ করে ড. ফ্লিট -এর কাছে পাঠিয়েছিলেন। পাঠোদ্ধারের জন্য ড. ফ্লিট পাঠিয়েছিলেন অধ্যাপক কীলহর্ন -এর কাছে। মানভূম, সিংহম ও ওড়িশার সংশ্লিষ্ট অঞ্চলে মান রাজাদের শাসন যে খ্রিস্টীয় ছয় শতকে বিস্তৃত ছিল, সে বিষয়ে সুস্পষ্ট প্রমাণ পাওয়া যায়। (Epigraphia Indica, vol. IX).

পুরুলিয়া জেলাকে (প্রাচীন মানভূম) বলা হয়, - উন্মুক্ত সংগ্রহশালা (open museum)। মানুষ সংগ্রহশালা যান মানব সভ্যতার বিভিন্ন যুগের স্থাপত্য ও ভাস্কর্য দেখতে। মনুষ্যসৃষ্ট শিল্পকর্মগুলি সংগ্রহশালায় সাজানো থাকে। পুরুলিয়ার মানুষ এই শিল্পকর্মগুলি দেখেন নিজের গ্রাম অথবা উন্মুক্ত প্রান্তরে। দূর অতীতে কোন-যুগে কোন শিল্পী গড়ে তুলেছিল এই শিল্পশৈলীর নিদর্শনসমূহ। তারা জানেন না কোন সভ্যতার ধারক-বাহক ছিলেন, তাও বোঝেন না। মানুষ জন্ম থেকেই দেখেছে অজস্র মন্দির ও মূর্তি অবহেলায়, অনাদরে যত্রতত্র পড়ে আছে। প্রকৃতি ও মানুষের শত অত্যাচারে, এগুলি বিনষ্ট, বিকৃতি হচ্ছে প্রতিদিন। মূর্তিচোরদের সর্বগ্রাসী লোভ ধীরে ধীরে এই প্রাচীন ভূমিকে নিঃশব্দ করেছে, এখনও করে চলেছে। পুরুলিয়ার প্রাচীন ইতিহাস বিস্মৃতিতে ঝাপসা। জনশ্রুতিগুলি অতিরঞ্জনায় আচ্ছন্ন, নয় বিকৃত হয়ে আছে। প্রাচীন স্মৃতিচিহ্নগুলি ক্রমশ ধ্বংসের মুখে, পুরাতাত্ত্বিক সন্ধান এখনো সম্পূর্ণ হয়নি।

পুরুলিয়া নামক ভূখণ্ড অতীতে বিভিন্ন নামে পরিচিত ছিল, যথা: মানভূম, জঙ্গল-মহল, পাচেট, অটবীদেশ, বজ্রভূমি প্রভৃতি নামে এই ভূমির পরিচয় ছড়িয়ে আছে প্রাচীন মধ্যযুগের ইতিহাস।

প্রাচীন মানভূমের স্থাপত্যশৈলীর পৃষ্ঠপোষকতায় প্রধান স্থানে ছিল তৈলকম্প, পঞ্চকোটরাজ্য, জয়পুর, বাঘমুণ্ডি, বরাভূম ও মানবাজার - মূলত মানরাজারা এই পৃষ্ঠপোষকতায় ছিলেন। মানভূম-পুরুলিয়া সভ্যতা সৃজনে পঞ্চকোটরাজবংশের ভূমিকা সর্বাধিক।

প্রাগৈতিহাসিক ইতিহাস-চর্চা থেকে আমরা জেনেছি মানবসভ্যতার আদি বাসস্থান ছিল পর্বত আরণ্য অঞ্চল, গুহা, সমুদ্র ও নদী-উপত্যকা। সভ্যতার অষ্টা শেষপর্যন্ত মানুষই। কিন্তু সভ্যতাকে লালন-পালন ও পরিপুষ্ট করে নদীগুলি। পৃথিবীর সমস্ত নদী-উপত্যকা জুড়েই তাই মানব সভ্যতার গতিপথ খুঁজতে হয়। প্রাচীন মানভূমও তিনটি নদী-উপত্যকার দান। এর উত্তর 'এ কংসাবতী, শিলাবতী। দক্ষিণে সুবর্ণরেখা নদী অববাহিকা। পুরুলিয়া তথা প্রাচীন মানভূমের ইতিহাস ও সংস্কৃতির প্রত্নতাত্ত্বিক নিদর্শনগুলি সৃজন-পালন ও ধ্বংসে নদীর স্থানে প্রধান। তাই, বর্তমান আলোচনার ভিত্তিভূমি হবে নদী অববাহিকা।

ইতিমধ্যে, আলোচ্য স্থানের ইতিহাস সন্ধান, উন্মোচন ও গবেষণায় যে সমস্ত বিদ্বান পণ্ডিতবর্গ পূর্বসূরি ছিলেন, তাদের মধ্যে উল্লেখযোগ্য হলেন - মহামতি ডাল্টন, J.D. Beglar, David Maccachon এবং বর্তমানে, Calcutta University'র Department of Archaeology'র অধ্যক্ষ-শিক্ষিকাগণ এই কাজে এখনো নিরলস পরিশ্রম করে চলেছেন। তার একটি উদ্দেশ্য, ইতিহাসের ধ্বংস ও বিকৃতির হাত থেকে উদ্ধার করে আনা।

প্রসঙ্গত উল্লেখ্য, গবেষক যে মানভূমের কথা বলছেন, সেই মানভূম বর্তমান পুরুলিয়া বলতে যা বোঝায় সেইটুকু অংশ নিয়েই গঠিত ছিল না। অবিভক্ত বাংলার, বিহার এবং উড়িষ্যার কিছু অংশ এর অন্তর্গত ছিল, যেমন সিংভূম, ধলভূম ইত্যাদি।

- (১) গবেষক মনে করেছেন, এযাবৎ প্রাচীন মানভূম এর ইতিহাস নিয়ে আলোচনা ও গবেষণা হয়েছে খুবই কম।
- (২) পুকুর খুঁড়তে, বাঁধ কাটতে বা পতিত জমিতে লাঙ্গল দিতে গিয়ে যখন হঠাৎ কোনও নিদর্শন উঠে আসে, বিস্মৃত হয়ে যান গ্রামের মানুষ। কোনও প্রাচীন মূর্তি এলে, ইনি কোনও দেবতা ভেবে, গাছের নিচে কি ষোলোআনার চালাঘরে সাজিয়ে রাখেন সেসব। নিজেদের মতো করে নামকরণও করেন। গবেষক মনে করছেন, মানব সংস্কৃতি ও সভ্যতার বাস্তবে অমূল্য নিদর্শনগুলি অনুসন্ধান ও পুনরুদ্ধার করে সংগ্রহশালার দৃষ্টি আকর্ষণ করা।

তথ্যসূত্র

'পুরুলিয়া', ২০০৯, তরুণদেব ভট্টাচার্য।

'পুরুলিয়ার পুরাকীর্তি', পরেশ চন্দ্র দাশগুপ্ত।

'পুরুলিয়া প্রসঙ্গ', সুভাষ রায়।

'West Bengal District Gazetteers, Purulia, 1985'।

হরিপদ সাহিত্য মন্দির পত্রিকা ১৪১৪, ১৪১৫।

On necessity for conservation of natural history museums : A geological study from different sites of India

ASOK KUMAR BHATTACHARYA

Introduction

Understanding the earth, its systems and their mechanism of work throughout the geological time since initiation are of paramount importance to people of all spheres of life. Starting from all sorts of resources of economic importance and objects needed for our livelihood to the ultimate sustenance of human civilization we owe to the earth material. The history of the formation of earth and the various events throughout its evolution are imprinted in the stratigraphic records of rocks and minerals. But most unfortunately, many of these resources together with the geological history of the earth are in the path of gradual destruction or obliteration to various degrees because of overexploitation of these resources by man-made activities.

The earth is a storehouse of its every creation. The various stress fields that were operative during the process of crustal evolution are preserved in the diastrophic structures of rocks. In order to know the behavior of rocks under various stress-strain fields, we need to preserve the diastrophic structures. The early origin of plants and animals and their procession through the geological times are preserved in the fossil records in rocks of various ages. The fossil-bearing rocks that yield a remarkable record of ancient lives, palaeo-environment and palaeo-ecology need to be protected with special attention.

The subject of sequence stratigraphy which deals with the sedimentary record as driven by cyclic sea level changes through geological time is of great importance to unravel the stratigraphic record related to marine transgressions and regressions. Records of such sequence stratigraphy are often at stake due to unawareness of the importance of such areas. In most occasions, a few stakeholders and beneficiaries without taking care of the very basic concept of the sustainability of earth resources, indiscriminately exploit such non-renewable resources of the earth. In the process of such exploitation, many major events of earth's history either get obscured or totally expunged for ever.

India is a vast country with a huge wealth of such geologically important areas and resources (*Figure. 1*). There is, thus an urgent need for geoeducation to the beneficiaries, stakeholders and lay people towards understanding the importance

of such areas .The present paper highlights several case studies from India with the following objectives :

- (i) Identification of geologically important fossiliferous stratigraphic sections, sites with important diastrophic structures, economically valuable mineral deposits, industrially important rock reserves, sites with geological marvels and geological heritage sites undergoing destruction by man –made activities.
- (ii) Detection of the manner and causes of such destructions.
- (iii) Estimation of the degree of destruction till date.
- (iv) Catering basic geo-education and awareness among lay public and beneficiaries about the importance of protection and conservation of such areas.
- (v) Provide suggestions to keep them under national monuments , parks and heritage sites, if required by legislation and enacting stringent policies.
- (vi) Enhancing the potential of geo-tourism.

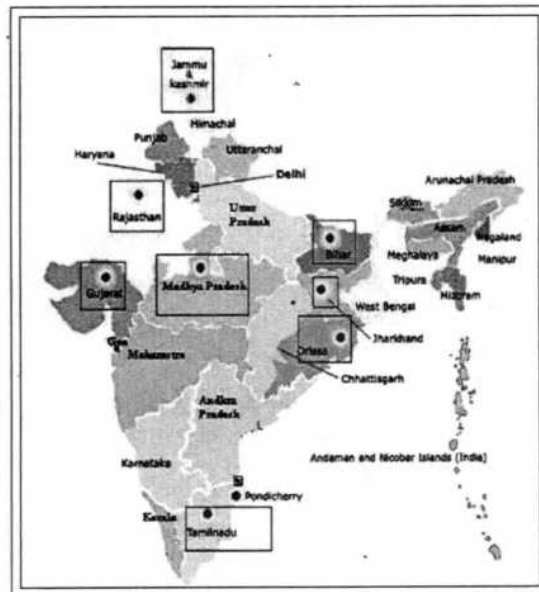
Categories of Various Geologically Important Features

Depending on specific geological importance the following categories of national parks have been recommended :

- (i) *Fossil Parks* : In India there are many fossil beds of different stratigraphic sections with excellent preservation of fossil –a tool for determining relative age of rock beds, palaeo-environment and palaeo-ecology. Although the Geological Survey of India have already designated a few fossil parks from some specific areas of India, like the marine fossil park, fossil wood park, Gondwana fossil park, Siwalik fossil park, and Stromatolite park, there is a dire need for establishment of many more.
- (ii) *Rock Monuments* : Some areas of India are characterised by the occurrence of some conspicuous rock exposures of different geological ages. Some of these rock exposures need special care for conservation as rock monuments. The Geological Survey of India have already taken care of some of them occurring in some specific areas and these include the Peninsular Gneiss, The columnar basalts, the pillow lavas, the Pyroclastic rocks, the nepheline syenites of Kishangar of Rajasthan, the Barr conglomerate, the welded tuff and the Charnockite of Nilgiri hills, Tamilnadu. In addition to such designated rock monuments, many other marvellous rock monuments await conservation.
- (iii) *National Park of significant stratigraphic sections* : Various stratigraphic sections with definite signatures of change of major geological events should be brought under this category.
- (iv) *National park of diastrophic structures* : Many continental areas exhibit certain complicated diastrophic structures that are important to unravel the history of the earth, the history of different phases of crustal deformations and the

- behavior of rocks under various stress fields in different geological time. Areas with such diastrophic structures can be preserved under this category.
- (v) *National park of important sequence of sedimentary structures* : Sedimentary structures are good tools for interpreting the hydrodynamics of sedimentation and basin analysis. There are many stratigraphic sections where such sequences occur as treasures of the earth history. Conservation of such features are to be done under this category.
 - (vi) *National Parks of economically important deposits* : Many economically important ore deposits exhibiting mode of occurrence of the ore shoots and their structural control, like many other parts of the world, characterise some parts of India. Such ore deposits are to be mined rationally so that at least a part of such occurrence is kept undisturbed for understanding the structural control of the ore shoots.
 - (vii) *National park of geological marvels* : Several geological features like balanced rock, sea arches, sea caves, pedestal rock, eskars etc. often stand as geological marvels of great wonders. Such areas need special conservation strategy. The Lonar lake of Kashmir and some other marvellous features have already been protected under this category by the geological Survey of India.

Figure 1: Map of India showing areas of mining and exploitation of geologically important rock bodies in different states in the present study.



Some Case Studies

Destruction of Diastrophic Structures

Case Study from the Archaean Rocks of Jharkhand State

Style of Plunging Folds in Quartzite Bands and their Topographic Expressions :

The Ghatsila–Galudih area of Jharkhand state exhibits a unique landscape controlled by deformations of quartzite bands (15-20m width & 50-190m height.) into intricate plunging folds, belonging to the Archaean metapsammitic and metapelitic sequence. Exposures of these white, hard quartzite bands exhibit a series of more or less continuous fascinating plunging folds with topographic expressions of hillocks and ridges related to limbs and closures of anticlines and synclines in a metapelitic (mica schists and micaceous quartzites) rolling country.

Geological Significance :

The quartzite beds exhibit large-scale primary sedimentary structures and penecontemporaneous deformation structures which are often useful to determine the top and bottom of the stratigraphic sequence. In addition, the unique relationship of bedding and cleavage help determine the direction of anticlinal and synclinal closures and the stratigraphic top of the rock sequence. The diastrophic structures are important to interpret the various phases of deformations of the crustal rocks and analyse the geometry of stresses that were responsible to bring about such complex structures in the Archaean rocks of Indian shield.

Nature of Destruction of the Folded Structures :

A few decade-wide practice of blasting, quarrying and crushing of quartzite bands for use as road ballasts has totally destroyed many limbs and closures of such plunging folds resulting scarcity of exposures, and problems for interpreting the fold styles and their geometry. Many sections with primary sedimentary structures and penecontemporaneous deformation structures, important for basin analysis and determination of palaeocurrent are also destroyed with the indiscriminate quarrying of quartzite bands.

Measures to be Taken for Protection and Conservation :

A basic level geo-education to a small group of beneficiaries and public awareness programme can save this structurally marvel area and the site should be immediately declared as a “National park of diastrophic Structure”.

Destruction of Fossil Beds for Cement Manufacturing

Case Study from Guryul Ravine, Kashmir

Mode of occurrence and significance :

The Guryul Ravine in Kashmir region is a storehouse of rich Permian fossils of marine plants and animals and is one of the world's richest fossiliferous limestone beds. They are supposed to be the best preserved record of the Permian – Triassic extinction event in India that showed the most important changes in life in geological time (Chris, 2009).

Nature & Causes of Destruction of Fossil Beds :

The fossiliferous beds of Guryul Ravine are surrounded by good quality limestones that are used for manufacturing cement. Blasting and quarrying of limestones for use in cement industry are destroying the valuable fossils records as well. Quarry owners and quarry operators knowingly or unknowingly about the importance of Guryul fossil records are rather more interested in quarrying limestone and sending the truckload of fossiliferous limestone chips to local cement factories from which the quarry operators earn a good amount per truckload of fossil-bearing rock chips. The larger limestone blocks are transported to construction industry.

Geological Significance :

Due to indiscriminate quarrying and destruction of the fossil beds, the bulk of stratigraphically significant fossils - the valuable palaeontological tool for deciphering palaeo-ecology, biostratigraphy and dating of rocks of the Guryul section are on the gradual obliteration. If the process of destruction continues unchecked, the Guryul section would soon be destroyed totally with the loss of one of the best sections of Indian stratigraphy showing the most important changes in life in geological time.

Measures to be Taken for Protection :

According to Ghulam Mohamad Bhat of Jammu University, only a few years ago, local officials designated the area as a 'protected site' but all in vain as that has not put an end to limestone mining in the area. It has thus become essential to bring the site under strong vigil even with the application of legislation. Lay people should be brought under awareness programme and the stake holders are to be made realise the significance of the stratigraphic section. The area should be declared as a "national park of significant stratigraphic section".

Case Study from Cretaceous of Trichinopoly District ,Tamilnadu State

Stratigraphic position of fossiliferous beds :

Four stages of fossiliferous beds, viz., Niniyur, Ariyalur, Trichinopoly and Utatur in the Cretaceous succession of Trichinopoly area of Tamilnadu have been discussed by Krishnan, (1960). Of these The Trichinopoly stage is richly packed with ammonites and many other invertebrate megafossils. The Utatur stage includes the famous coral reef limestone horizon.

Purpose of Destruction and Degree of Degradation :

Since 1940, a number of cement factories of Tamilnadu have been using the fossiliferous limestones of the Trichinopoly Limestones horizon containing valuable megafossils of ammonites, lamellibranchs, gastropods and corals. The valuable fossiliferous limestones are indiscriminately put to kilns without considering their immense value as indicators of palaeo-environment and palaeo-ecology. Rampant exploitation of coral reef limestone of the Utatur stage, for their value as decorative building stones, has almost totally obliterated the coral reef rocks.

Consequence of Mining :

With the loss of Trichinopoly fossils (ammonites, molluscs etc.) in the process of cement manufacturing, we will soon lose a 'natural museum of palaeozoology' containing more than 1000 species of extinct mollusks and cephalopods, and a unique record of distribution of land and sea of the Cretaceous time. In addition, the vital keys to identify the two important events namely, a) the history of the earth indicating the end of Mesozoic era and advent of the great Cenozoic era, and b) the evidence of Upper Cretaceous (Cenomanian) marine transgression in the south-east coast of India, will be lost for ever.

Case Study from Tertiary succession of Kutch, Gujarat State*Stratigraphic positions of fossiliferous beds :*

The fossiliferous beds in the Tertiary succession of Kutch, Gujarat (Wadia, 1961) contains the richly fossiliferous calcareous shales, clays and marls of 1200 feet thick Gaj Series of Lower Miocene age and impure Nummulitic limestone bed of 700 feet thick Kirther series of Upper to Middle Eocene age.

Mining of Fossiliferous Limestones and its Consequence :

From the Tertiary succession of Kutch, the richly fossiliferous Nummulitic limestone bed (Kirther Sr.) and the Calcareous shales, clays and marl bed (Gaj Sr.) are rampantly exploited by open cast mining up to a depth of 10 meter for manufacturing cement. As a result of such indiscriminate mining, the Nummulitic limestone bed - an unfailing landmark of Upper to Middle Eocene age, and the richly fossiliferous calcareous shale bed of Lower Miocene age are on the way of rapid obliteration.

Suggested Conservation Strategy :

A basic level geo-education to the beneficiaries can save the remaining part of these important fossil-rich sections of Tamilnadu and Gujarat states respectively. Moreover, the sites should be immediately declared as "National Park of significant stratigraphic sections".

Destruction of Plant Fossils of Jharkhand State by Coal Mining*Plant Fossils of Damodar Valley and Rajmahal Area :*

The Gondwana plant fossils of Permian age of the Damodar Valley coal fields and the plant fossils of Jurassic age of Rajmahal area are being indiscriminately destroyed by blasting and mining operations followed by making of roads in the mining area. A huge proportion of fragile plant fossils also gets crushed under the tyres of heavy vehicles that move for transportation of coal.

Magnitude of Destruction and Remedial Measures :

Commercial interests and lack of awareness act as the primary cause of destruction of this invaluable storehouse of Gondwana plant fossils. Although a MoU had been

signed among the state government, Birbal Sahni Institute of Palaeobotany and the National Building Construction Corporation. under the umbrella of DST, Govt. of India, to establish a "fossil park", but till today a vast resource of fossils plants has already been destroyed (Priyadarshi., 2010)

Destruction of Stromatolites of Jharkhand and Orissa States by Iron Mining Operations

Mode of Occurrence and Importance of Stromatolites:

The Iron Ore Formation of Noamundi- Joda areas of Jharkhand and Orissa states revealed good exposures of stromatolitic limestones and dolomites of stratiform, nodular and columnar types. Their formation is attributed to debris-binding and bio-chemical processes of benthonic blue-green-, green- and red algae (Priyadarshi, 2010). They are the dominant life forms for over 3.8 billion years up to the present day and are good indicators of organized life on earth.

Causes of Destruction and Consequence :

Brring a few localities, extensive iron-mining operations in these areas have set the stromatolites on the path of destruction. Such destruction would lead to the obliteration of the history of origin of early life and its evolutionay trend. The area should be brought under conservation strategy by creating a "Stromatolite park" withut any further delay.

Destruction of Makrana Marbles of Rajasthan State

Mode of Occurrence and Magnitude of Destruction :

Some 50-miles long and 1-mile wide outcrops of Makrana marbles of the Raialo Series of rocks in Jodhpur district of Rajasthan had long been known as the source material for the much adorned Mughal buildings and monuments of Delhi and Agra, the Victoria Memorial of Kolkata and some famous buildings of Rajasthan, Uttar Pradesh and Punjab states.

Long term practice of mining at about 40 locations along exposures of these beautiful marbles (*Figure.2*) for construction purposes has led to rat-hole mining of marble reserves at many places, causing an appreciable depletion of their reserves.

Remedial Measures and Conservation Strategy :

A mass awareness programme based on geo-science education should be immediately launched to protect at least the remaining relics of such beautiful marbles. The area should be protected under "Rock monument".

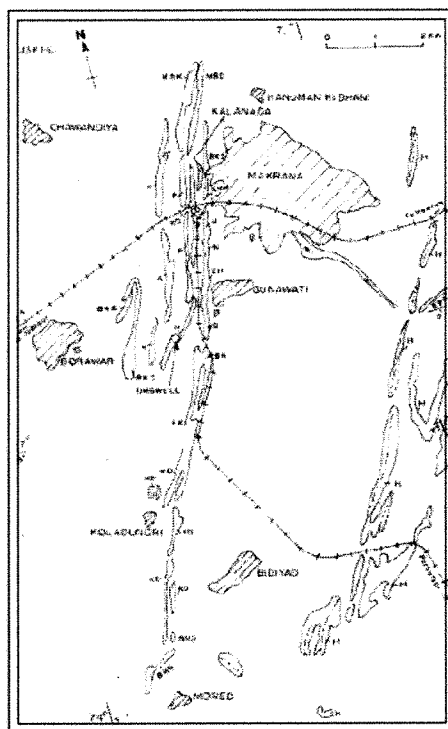


Figure 2: Map showing mining areas along the exposures of Makrana marbles in Rajasthan.

Destruction of Red Sandstones of Rajasthan State

Nature of Sandstones and Causes of Destruction :

The red, maroon and purple sandstones of the Upper Vidhyan rocks occurring in Madhya Pradesh and Rajasthan were famous for construction of some ancient forts, monuments and buildings during the period of Mughal and British rule in India.

The durable sandstones often having cross- beddings and ripple marks are good indicators of their shallow water origin and direction of palaeo-current of the depositional basin.

Recent practice of mining of these sandstones for purpose of construction has led to an extreme depletion of their reserves. Blocks of rippled and cross-bedded sandstones are even used in road pavements and hotel floors.

Remedial Measures and Conservation Strategy :

A mass awareness programme based on geo-science education should be immediately launched to protect a portion of these rock reserves under "Rock Monuments"

Conclusions

Because of the lack of proper geo-education we are loosing many of our geologically important sites with lots of information about the formation and chronological evolution of the earth. It is true that many of our development projects related to constructions and industries of the modern time need mining of earth material for our better living. But a balance between the exploitable material and the reserve of non-renewable resources is to be maintained at any cost. The trend of rapid overexploitation of building and ornamental stones has increased to a great extent during the last two to three decades. This trend is to be checked since the loss of records of the earth can never be compensated by any other means. For this, catering geo-education is a must for all. It is, however, not recommended that mining operations and constructional works should be stopped. What is important is that these operations should be done more judiciously and with proper knowledge on the geological significance of the sites undertaken for such operations. Setting up of rock monuments, fossil parks, stratigraphic parks etc. are essential to prevent the loss of such heritage areas, extremely important for the conservation of the earth's history. Restoration and maintenance of the geological heritage sites in the form of various "national parks" would also be helpful to enhance the economic growth of the country through geo-tourism business.

References

- Chris.M(2009). Cement Manufacturing Destroying Kashmir Fossil Beds. Information from National Geographic.
- Priyadarshi,N.(2010)..Mining and other operations destroying fossils of Jharkhond State of India;Stromatolites in Jharkhond. In Blog : Earth Day Network.
- Krishnan, M.S.(1960.) Geology of India and Burma,.Higginbothams(Private) Ltd. Press Mount Road, Madras, India.
- Wadia , D.N. (1961). Geology of India,(3rd Ed.), Macmillan & Co Ltd.Press New York.

Silkworm resource and biotechnology in India

CHHANDA DAS

Silk, considered the 'queen of fibres' is a highly valued textile fiber of animal origin. Mankind has always loved this shimmering fibre of unparalleled grandeur from the moment its discovery. Exquisite qualities like the Natural sheen, inherent affinity for dyes and vibrant colours, high absorbance, light weight, resilience and excellent drape etc. have made silk, the irresistible and inevitable companion of the eve, all over the world.

Silk fibres are a continuous protein fibre created from natural processes and extracted from cocoons, which means that these fibres can retain the properties that are associated with the chemicals produced by the silkworm. When secreted by the silkworm, the natural state of the fibre is a single silk thread made up of a double filament of protein material (fibroin) glued together with sericin, an allergenic and gummy substance that is normally extracted during the processing of the silk threads.

Sericulture in India

The Art of silk production is called Sericulture, that comprises of cultivation of mulberry plants, silkworm rearing and post cocoon activities leading to production of silk yarn. India is an important and a major sericulture country in the tropics. It has occupied a place of pride in global sericulture map being the homeland of all the four varieties of natural silks : Mulberry, Tasar (including Oak tasar), Eri and Muga. Tropical tasar silkworm is reared by the tribal inhabitants of Jharkhand, Chattisgarh, Orissa, Andhra Pradesh, Maharashtra and West Bengal States while the temperate tasar silkworm feeds on oak plants in the North Eastern sub-himalyan states of India. Muga silkworm is exclusively found only in Assam state and is known for its unique valuable golden coloured silk fibre. The non-mulberry silks are called "vanya silks". Mulberry sericulture dominates, with a share of 89 per cent in production, and 95 per cent in exports. 98% of mulberry silk is produced in the States of Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu & Kashmir.

The present global scenario clearly indicates the enormous opportunities for the Indian Silk Industry. The need of the hour is to produce more bivoltine silk with reduced cost of production to meet the growing demands of quality silk. Realising this, the Govt. of India is taking all out efforts to boost bivoltine production in the country with the technical support from Japan International Co-operation Agency.

India has the unique distinction of being the only country producing all the five kinds of silk - Mulberry, Eri, Muga, Tropical Tasar and Temperate Tasar. While it holds the fifth production of mulberry silk, it ranks second in the tasar silk. Sericulture provides gainful employment, economic development and improvement in the quality of life to the people in rural area and therefore it plays an important role in anti Poverty programme and prevents migration of rural people to urban area in search of employment.

Moriculture

Cultivation of mulberry plants is referred to as Moriculture. It is an agricultural activity. Flat, deep, fertile, well drained loamy and clay loamy with good moisture holding capacity soil is ideal for mulberry cultivation. In India, because of the prevalence of favourable climatic conditions, mulberry is cultivated mainly in five states, viz., Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu & Kashmir. These five states collectively account for 97% of the total area under mulberry cultivation and 95% of raw silk production in the country. Mulberry (*Morus* sp.) is a crop plant of economic importance in sericulture. Mulberry improvement through conventional breeding has substantially contributed to the success of sericulture industry. However, the application of biotechnology in mulberry crop improvement holds a great promise especially in those areas where conventional research has not achieved the desired success. The biotechnological research in genome characterization with isozyme and DNA markers, micropropagation, regeneration from callus, somatic hybridization, in vitro conservation technologies like slow-growth storage and cryopreservation, genetic transformation etc., have contributed to the success in mulberry improvement.

Seed Production

The silkworm seed production centers are referred to as grainages. The silkworm seed known as Disease Free Layings are prepared in the centers and supplied to the farmers for rearing. Both Government and private sector grainages are involved in this activity. Indian silkworm breeds are multivoltine (i.e., they produce several breeds a year) and though, good progress has been achieved in cross breed (multivoltine x bivoltine) silk production, the quality still remains incomparable to that of Chinese breeds which are bivoltine.

Silkworm Rearing

Silkworm Rearing is considered to be an agro based cottage industry since it involves mulberry cultivation. Silkworms are lepidopteran insects. The larva are caterpillars, which, at the end of the larval stage, spin a cocoon of silk, and transform into pupae and finally into adult moths. The quality and yield of silk depend on

availability of healthy silkworms, which itself depends on high-quality feed and disease-free stocks. Silkworms are reared for the production of "cocoons" which is the raw material for silk production. Silkworms are reared in well ventilated rearing shed following shoot rearing method. The new born larvae of the silkworms are kept in a warm and stable environment and given plenty of mulberry leaves, their favourite diet.

Marketing of cocoons

The farmers can sell the cocoon produced by them in the nearest Govt. Cocoon Markets. In the cocoon markets reasonable floor price is fixed by scientific methods and the final selling price is decided in the open auction. Here, silk reelers buy the cocoons produced by the farmers for producing silk.

Silk Reeling

Extraction of silk filament from cocoons by employing a set of processes is known as silk reeling. The silk obtained out of the reeling process is referred to as "Raw Silk". It is the silk reeled by drawing together the filaments from a number of cocoons (6–12) based on the thickness required for weaving sector. Reeling forms a vital link in converting the agricultural produce viz., cocoons into an industrial output yarn. Reeling involves a series of intricate processes while converting the cocoons into raw silk. The reeling sector in India is cottage based and highly decentralized, employing a variety of reeling devices viz., charkha, cottage and domestic basins, semi-automatic, automatic and multi-end reeling machinery. Generally, at the village level, there are charakhas which accounts nearly 50% of the total raw silk production in the country. The charkha silk yarn though of poor quality has a distinct identity in the market and is generally associated with bulkiness and preferred as weft yarn largely by the handloom weavers. Central Silk Technological Research Institute, Central Silk Board, Bangalore 'Multi-end reeling machinery package' (an improvement over the cottage basin) was introduced as the most appropriate technology to handle the available quality of cocoons to produce gradable quality raw silk.

Marketing of Raw silk

The raw silks produced by the silk reelers are marketed directly to the weavers or through Silk Exchanges functioning in the Sericultural States.

In the Silk Exchanges all the raw silk lots brought by the silk reelers are tested for quality. On the basis of quality of raw silk and the price prevailed in major marketing centre, floor price is fixed and then they are auctioned. The Silk Exchange enables the reelers to get immediate cash for the raw silk transacted by them.

Silk Weaving

The raw silk cannot be directly used for weaving. The raw silk is to be twisted before they are fed into looms. The operation of conversion of raw silk into twisted silk, is termed as twisting. The twisted silk is referred to as Ready Silk. Twisting is undertaken either by separate entrepreneurs or by the weavers themselves. The silk weaving is done either on handlooms or power looms. The traditional silk sarees and dhoties are made on handlooms whereas the printed sarees, dress materials, etc., are made on power looms.

Biotechnology in Sericulture

Genetic engineering may lead to better varieties of silkworm that produce more silk are more resistant to diseases and environmental fluctuations. The silkworm is also a convenient model for studies of the molecular basis of development and gene expression using the tools of molecular biology. The recent advances in recombinant-DNA techniques have revolutionized biology and given a fresh impetus to biotechnology.

Even with the successful introduction of hybrid mulberry silkworm strains and adoption of modern practices, growth in Indian sericulture is facing stagnation as the gap between genetic and realized potentials of the silkworm hybrids is still quite large. Virus infections alone lead to a loss of almost 40% of the silkworm cocoon crop annually. Indian scientists are now using biotechnological tools to ameliorate the production and quality scenario, improve international competitiveness and enable the industry rise to its full potential. Department of Biotechnology (DBT), Govt. of India is spearheading this effort backed by the Central Silk Board and other R&D institutions. Recent endeavors and achievements of Indian researchers in the field of seribiotechnology have placed the country on a very solid footing in this area.

Although the focus of seribiotech development is to generate products to empower farming population engaged in sericulture, the process has also created a robust and competitive infrastructure to carry out world-class seribiotech research. It is only natural that India is now emerging as the new frontier in seribiotechnology. A great example of silk enhancement in action is the application of nano technology to silk fibres in order to add to their natural longevity and strength, and therefore become able to withstand hotter washing temperatures.

Some initiatives like cocoon testing in some select markets, raw silk testing in the silk conditioning and test houses and technical service centres across the country by the Central Silk Technological Research Institute, Central Silk Board, Bangalore has created visible impact to bring awareness about quality among the rearers, reelers and weavers. This is important to achieve quality silk of international standard. Recently, Central Silk Board has started a testing laboratory for Silk and Zari at

Kancheepuram to facilitate customers, producers and other stakeholders for spot testing of silk and zari material without any destruction to the products by x-ray analysers. More importantly, 'Silk Mark' Scheme is introduced by Silk Mark Organisation of India (SMOI), a registered society, sponsored by Central Silk Board, Ministry of Textiles, Government of India. The Silk Mark is a quality assurance label for the assurance of pure silk and in addition serves as a brand for generic promotion of Pure Silk.

Reference

Annual Report of Central Sericultural, Research and Training Institute, Central Silk Board, Mysore. Indian Silk, Vol. 47(5), 2008.

Md. Aslam (2008) Adding value. Biotech News, Vol. m (5), p. 9.

Planning Commission Report, Article by Dr. K. Venkatasubramanian, Member, Planning Commission, www.planningcommission.nic.in

Proceeding of the 20th Conference of the International Sericulture Commission, Bangalore, December, 2005.

Sericologia, Vol. 44(3), 2004.

Sericulture and Silk Industry Statistics, 2003, Central Silk Board, Govt. of India, Bangalore.

Animal Diversity & Indian Philately

SUNANDA MANDAL

Introduction

In feudal system Philately did not express the hopes, linking's and feelings of general individuals. Stamps of that time gave information about the upper class of the society by printing the faces of Kings and Queens. Today Philately not only shows the faces of political leaders but also show the faces of art & cultural leaders and by that the true love of the country people is reflected. Beside the above, agricultural systems, industries, different symbols of development are also reflected through stamps. Flowers, birds, animals, nature, paintings, arts and many other things have been accepted in Philately. Philately is closely related to our life. With other things it contains pictures of different animals, bird i.e. different zoological specimens. These specimens are at the door of extinction because of different reasons of which one of the major causes is human interferences. Philately bearing pictures of zoological specimens is a step to make people aware about our national natural resources and their present status and also to become polite to them.

Short History of Indian Philately

The Oxford English Dictionary defines the word 'Philately' as the "Collection and Study of stamps". The word was coined by France who combined the Greek word 'Philos' meaning 'love' with 'Atelia' meaning 'Tax free'.

Indian postal system had its existence in the reign of Sher Sha. But later it was extinct. In 1774, 31st March Warren Hestings again started this system in India. In 1868 Kolkata G.P.O. was established. The first Philately in India was started in 1852, 1st July by the Commissioner of Sindhu Pradesh (now Pakistan). But it was rejected as it was not granted by the East India Company. First government stamp of India was introduced in 1854. 4 stamps of different values & colours were printed & they included the picture of the face of Queen Victoria.

Animal Diversity & Philately

Animal diversity is the variety of zoological specimens from genetic variants and totality of genes of same species & variety of ecosystem of a specific region including their interaction and processes. It differs from place to place as each habitat has its distinct biota. Animal diversity provides many help to human being. These are –

- Maintenance and sustainable utilization of useful products and services of various ecosystems and also individual species require the presence of animal diversity.

- ▶ Since prehistoric period people have established link or developed religious, social, cultural values with species specific fauna for their own existence. We also can not undermine the economic cultural value of fauna exists in a global village.
- ▶ Animal diversity has got aesthetic value and attraction value hence people moves around the world to see and enjoy the fauna in different places. Eco-tourism, bird watching, watching of wild fauna and pet watching are an integral part of our national economy. These are also helpful to protect our national heritage.

Importance of animal diversity is an important issue and through publications, exhibition on various themes related to animal diversity Philatelic museums are doing good. Realizing the importance of animal diversity Philatelic museums are doing substantial work to create awareness among people.

Philatelic Museums & Preservation of Animal Diversity

Animal diversity is threatened by many factors like habitat loss and fragmentation, degradation and disturbance, pollution, over exploitation, intensive agriculture practice, cultivation or introduction of exotic species etc. To preserve and protect animals and to maintain sustainable development Philatelic museum is doing a good job. The fact remains that natural heritage through the world is under threat. As a result, number of species either becoming endangered or being extinct and animal diversity of the whole world is constantly threatened. To address the importance of conservation of animal diversity Philatelic museums released stamp for creating awareness about the need and necessity of conservation of animal diversity.

Zoological Specimens in Indian Philately

Stamps reflected different aspects of a country including fauna with the other aspect. India is not far behind in this place. Different stamps are issued in India on various zoological specimens. The stamps are beautiful and also colourful. Generally coloured photo of a zoological specimen is used on the stamp. In different time, several zoological specimens are flourished on Indian Philately. The stamps are published on different occasions, wherever it is the wild life preservation week or anniversary of project tiger. The zoological specimens on which stamps issued are various in type and nature. It includes cow, endangered species of India like – tortoise, snow leopard, tiger, lion, panda, different species of birds etc. It also includes some species of monkey, butterfly, coral, snake etc. Apart from this some national parks, biosphere reserve, sanctuary etc. are presented on stamps in several time.

Stamps on Zoological specimens

On the basis of different purposes and in different occasions several stamps on zoological specimens are issued in India. Till today several stamps on zoological specimens are issued in India.

Under phylum Cnidaria the following animal stamps were issued in India :

Fungia sp., Madrepora sp., Acropora sp.

Under phylum Arthropoda the following animal stamps were issued in India :

Cethosia biblis, Cyrestis achates, Stichopnthalma camodeva.

Under Class Reptilia the following animal stamps were issued in India :

Bamboo pit viler, King cobra, Gliding snake, Python, Aldabra giant tortoise, Gharial etc.

Under Class Aves the following animal stamps were issued in India :

Woodpecker, wagtail, Peacock, Pigeon, Babbler, Sunbirds, Falcon, Eagles, White stork, Sparrow etc.

Under Class Mammalia the following animal stamps were issued in India :

Himalayan red panda, Indian elephant, Indian rhinoceros, Swamp deer, Chital, Camel, Horse, Phyres leaf monkey, Indian bison or gaur, Kashmir stag, River dolphin, Sea cow, Golden langur etc.



Pictures of some Indian stamps on zoological specimens

Importance of Stamps

Stamp is a symbol of postage revenue. We pay the postage revenue through the stamp. It is a symbol of the receipt of postal tax.

Apart from this, different aspects of a nation, thought and activity of the Government, cultural, physical & biological aspect of a nation is reflected through the stamp. Ruling party publish their principles and thinking through stamps. The pictures of stamps give the introduction of the country and its classes. The communication system of a country is reflected through stamps. It introduces national natural resources to people. Commemorate important persons. To philatelist, a stamp means great value in terms its own value and beautifulness and in terms of money, because some rare and important stamps are sold in market in thousands of Rs. or Dollar.

So, a little stamp is not so little. They have great value. Philately is the king among the hobbies. It pays the postage revenue & sometimes it is the medium of earning money.

Relevance to Museum

A museum is a non-profit making permanent institution, In the service of society and its development and open to public, which acquires, conserves, researches, communicate and exhibits for the purpose of study, education and enjoyment, material evidence of people and their environment. (According to ICOM, Status II. Para – I)

Stamp is popular as a convenient & inexpensive medium of communication. According to ICOM definition of museum, stamp is important because it communicates a lot with people in very wider space. With the help of animal stamp any nation will be capable to communicate to her people about her zoological heritage.

In India several animal stamps are issued in time to time. These are good medium of communication to Indian people. It reflects the values of animals to the people. An exhibition on animal stamp may influence our society to a greater extent.

This Exhibition in a museum can:

- ▶ Enrich the knowledge about the zoological heritage of India.
- ▶ Aware people about the animals.
- ▶ Spreading the thought of preservation of wildlife.
- ▶ Aware people about the role of an animal in an ecosystem and our civilization.
- ▶ Enrich the number of philatelist.
- ▶ Aware about the habit and habitat of different zoological specimen.
- ▶ It introduces national natural resources to people.

Conclusion

India has a rich zoological heritage. But now-a-days they are decreasing. Several times many of the zoological species are flourished in Indian Philately, which reflects the value of Indian natural heritage.

But now-a-days the development of science & technology with electronic media influenced the use of stamp. The use of postage stamp is down falling.

Still a museum can make Philately popular, can attract people and make them aware about our biodiversity, their importance & influence them to conserve them properly.

Bibliography

Agarwal, V.K. (2003) : *Simplified Course in Invertebrate Zoology*, 588-638, New Delhi : S. Chand and Company Ltd.

Bhattacharya, S.N. Conservation of natural Heritage – A Micro Study, 3-38.

Clouded Leopard, retrieved June 24, 2013, from <http://www.images.jpg>.

Gaur, retrived June 24, 2013, from <http://www.India-stamp2288gaur.jpg>.

Indian Lion, retrieved June 24, 2013, from <http://www.India-stamp3155lion.jpg>.

Kotpal, S. (2004). *Modern Text book of Zoology : Invertebrates*, 634-661, Meerut : Rastogi publications.
Kashmir Stag, retrieved June 24, 2013, from <http://www.deer-stag-postage-stamp-india-issued1982.jpg>.

Laha, P.K. (2001). *Duktickit O Mudrar Kotha*, 1-10, Kolkata : New Bengal Press (Pvt.) Ltd.

Pigeon, retrieved June 24, 2013, from <http://www.India-stamp4771-pigeon.jpg>.

Sinha, Ganguly, Adhikari and Goswami. *Biology of Animals*, 416-794, Calcutta: Messers New Central Book Agency (Pvt.) Ltd.

Stegodon Ganesha , retrieved June 24, 2013, from <http://www.India1951.jpg>.

Sparrow, retrived June 24, 2013, from <http://www.India-stamp1713-sparrow.jpg>.

White tiger. Rewa, retrieved June 24, 2013, from <http://www.kg01006.jpg>.

Museums' preservation of insects: an important component of our natural heritage

NAFISA BEGUM

Introduction

Insects comprise more than three – fourth of the world's natural heritage. Out of the proposed thirty – two orders of insect world wide, at present India is supposed to have insects belonging to twenty – seven of those orders (Varshney, as cited in Chandra, 2011). Insects belonging to many of these orders are on display in museums (multi – purpose, natural history and entomology), across India. Besides having exhibits many of these museums also have insects as part of their reserve collections.

To maintain insect collections in museums they need to be preserved properly. Methods for preserving insects should be carried out as soon as possible, after they have been killed; because very dry specimens become extremely fragile to be handled with ease. According to Millar, Uys and Urban (2000): "Insects can be permanently preserved either dry, in fluid or on microscope slides." Selecting an appropriate technique for preservation of any insect group, depends mainly on these two factors – Size of the body and Degree of body sclerotization. Museums mostly put up before its visitors original entomological specimens preserved dry. The wet preserved specimens and insects or their parts mounted on slides are usually stored in the reserve.

Dry Preservation of Insects

Insects might be preserved dry by being mounted on pins. Special entomological pins are used for this purpose. Depending on the type of the insect, pins of appropriate sizes are required for mounting them. Further, insects should be mounted on the entomological pins correctly. Pinning is usually done vertically through the thorax of the insect, it is even better to pin slightly to the right of the midline (mesothorax). The conventional position of the pin for the insects of some of the different orders, are shown in the figures numbered 1 to 3. Whatever be the kind of insects, pinning should be done at a uniform height. For this a pinning block (wooden) is often used. Thus, the insects are easily adjusted, such that one - fifth of the pin is visible above the insect. There are certain insects whose wings should be spread properly before they are finally mounted, for example the Lepidopterans, Orthopterans, Odonates, beside some others. For this a spreading board is required.

The inset is set into the groove of this board using its' pin such that the wings come to the level of the wood on both the sides. Using blunt forceps the wings are arranged to obtain the proper orientation. To support the spread out wings rectangular pieces of wax paper or index card material are placed on them and pinned, as shown in the figure numbered 4. After the insect wings have set well, the supports and pins are removed. The completely ready insects are then set on a mounting board having a paper or polyethylene cover. Usually, the larger insects can be mounted in the above mentioned way; using the pins of the standard size.

The much smaller insects like beetles, leaf hoppers, etc. are double mounted on card points, card platforms, minuten pins or gelatine capsules, or might be glued to a pin. Card points or card platforms made up of good quality drawing card are used. Using a drop of glue (which dries quickly and is water – soluble or ethanol soluble), the insect is attached to the card point or card platform. Shellac might also be used to serve the purpose. But glue or shellac whichever is used should be of the correct consistency. If a card point is used it should be first mounted on an insect pin. In case of the latter, the platform with the specimen should be positioned on the pin using a pinning block.

For still smaller insects, like Microlepidoptera minuten pins are used for mounting. Thin blocks of cork or polyporous are taken and using entomological pins should be fixed into the mounting board. Then properly spread positioned insect mounted on a minuten pin is pushed into the other end of the block, spoken about earlier.

Certain small insects, like small Hymenopterans might be glued to an entomological pin on the right side of their thorax. Another method involves the use of gelatine capsules. The insects like, parasitic wasp is placed on cotton wool – compact and smoothened. This is placed inside a gelatine capsule which is mounted on a standard entomological pin.

Wet Preservation of Insects

Eggs, immature stages and soft bodied insects like aphids, silverfish, etc., become very dried so, these must be stored permanently in an appropriate liquid. The most commonly used liquid is (70 – 95) % ethanol. Alternative preservative fluids might be used as well, depending on the taxonomic group to which the insect belongs. The larvae in case of most insects must be first fixed using a suitable fixative like, Pampel's fluid which has the following composition: From Millar, Uys and Urban (2000, p. 57), we have :

- ▶ 750ml 95% ethanol
- ▶ 1375ml Distilled water
- ▶ 250ml 40% Formalin
- ▶ 125ml Glacial acetic acid

Using hot water for fixing the larval forms is also suggested.

Such insect specimens are stored in glass vials which are plugged with cotton

wool. Such vials are stored together inside wide mouthed jars. These jars are in turn filled with the same preserving liquid. These liquids used for wet preservation of insects are volatile in nature, so the jars used for keeping the vials must be secured well with a tight – fitting lid, supported with bands (for example, those made up of cellulose), in turn. The jar should be checked at regular intervals for maintaining the required quantity of the liquid preservative inside it. Figure number 5, shows the storage of wet preserved insect specimens.

Mounting Insects or Their Body Parts on Slides

Specimens belonging to certain orders like Thysanura, Zoraptera, Mallophaga, Siphunculata, Diptera, Siphonaptera, etc. are usually prepared on slides under a microscope. Preparing a microscopic slide of an insect or it's body part, is a tedious job, as it involves several procedures and particular order of insects require specialized techniques of preparation and mounting.

- ▶ **Cleaning** : A 10% aqueous solution preferably of caustic potash is used to clean the specimen. Soaking for a minimum period of 12 hours will disintegrate all the soft parts of the specimen, thus, only the chitinous parts and the membranous cuticle of the insect body remains.
- ▶ **Rinsing** : The specimen should then be rinsed thoroughly, in water or distilled water containing a few drops of glacial acetic acid. After this a wash in alcohol of the desired grade is preferred.
- ▶ **Staining** : This is an essential step on one hand for colourless or transparent material and on the other in case of very dark material. In the first case, acid fuchsin is preferred, whereas peroxide is used in case of the latter.
- ▶ **Dehydration** : This step involves the replacement of water with alcohol so grades of alcohol (ethanol) from 30% to 90% are required. This step is required if the specimen is to be mounted using a non water – soluble mountant.
- ▶ **Clearing** : The clearing media used in this step depends on the type of the mountant to be used for the specimen. Clove oil or xylol is used if the mountant is non – water soluble. Chloral phenol is used for specimens to be mounted in water – based media. In case the mountant is Euparal, this step might be omitted, because Euparal has clearing properties.

If mounting is not preferred immediately, the insect related material after preparation might be stored in a drop of glycerine, inside a glass or plastic microvial on the same pin as the insect.

- ▶ **Mounting** : The next step is to transfer the prepared insect or associated material on to a drop of mountant on a glass microscopic slide. Different kinds of mounting media are available to choose from, of which Euparal has already been spoken about in the previous paragraph. "Canada balsam is another mounting medium, perhaps the oldest in entomological use." (Hangay and Dingley, 1985). Usually a circular cover slip is lowered gently on to the

mount, after very careful positioning. It sets on the mounted specimen by its own weight.

Ringing : If a water – based mountant is used, after it dries out, atmospheric air and humidity might affect the mountant and the specimen. Thus, to prevent excessive dehydration and discolouration, ringing should be carried out. In this the slide and the edge of the adherent cover slip must be coated with a sealing agent. Various sealing agents are available commercially (for example, Glyceel). Specimen mounted on a slide with a cover slip on it appears flat and is in level with the surface of the slide. But in case of bulky specimens the cover should be placed over the specimen at a desired height, built using different means like glass or paper frames.

Only one specimen should be mounted on a single slide.

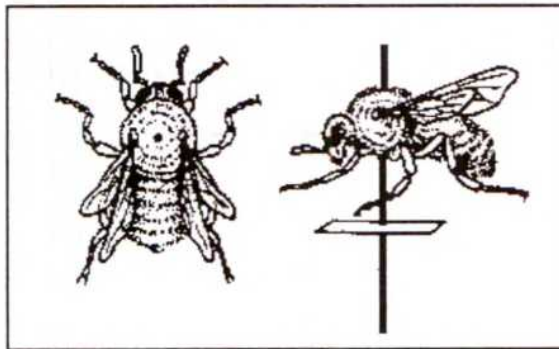


Figure 1 : Insects like wasps (Hymenoptera), flies (Diptera), dragonflies (Odonata) and many others are pinned as shown in this figure, through the thorax, between the base of the wings.

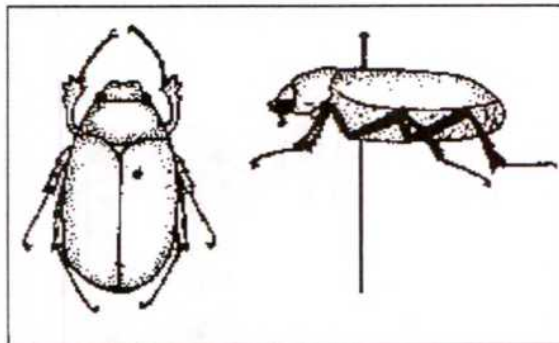


Figure 2 : This figure shows that the beetles (Coleoptera) should be pinned through the right of the center line, so that the pin emerges from the underside of the insect, between the middle and hind legs of the right side.

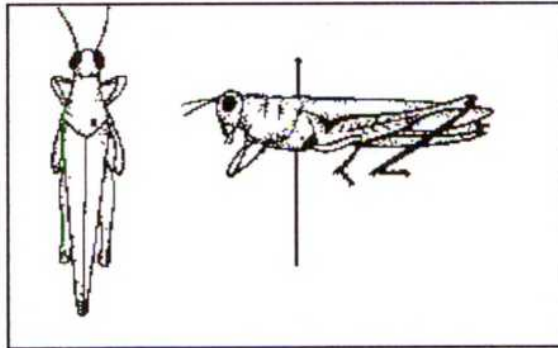


Figure 3 : The grasshoppers (Orthoptera) should be pinned so that, the pin emerges between the middle and hind legs of the right side.

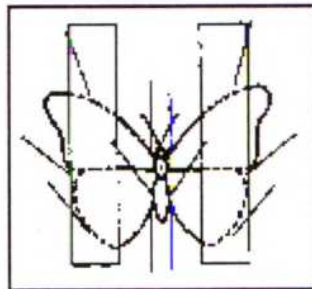


Figure 4 : Spreading butterflies on a spreading board and the wings are supported using pieces of wax paper reinforced with entomological pins.



Figure 5 : Storage jars, used for the preservation of vials containing fluid preserved entomological specimens.

References

- Millar, I. M., Uys, V. M. & Urban, P. R. (2000). *Collecting and preserving insects and arachnids*. SAFRINET.
- Schauff, M. E. 1986 (revised 2005). *Collecting and Preserving Insects and Mites: Tools and Techniques*. United States Department of Agriculture.
- Chandra, K. (2011). Insect diversity of Sikkim, India. In M. L. Arrawatia & S. Tambe (Ed.) *Biodiversity of Sikkim - Exploring and conserving a global hotspot* (p. 181). Government of Sikkim: Gangtok.
- Newtown, B. (2005). *St. Fair insect collection guide*. Retrieved January 28, 2008, from <http://www2.ca.uky.edu/entomology/dept/images/stfairbook.pdf>.

Medicinal plants used by traditional healers in Chotanagpur Plateau, India : A Museological Study

AMRITA DEY

Introduction

Ethnobotany is not new to India because of its rich ethnic diversity. Jain printed out that there are over 400 different tribal and other ethnic groups in India. The tribal constitute about 7.5 percent of India's population. During the last few decades there has been an increasing interest in the study of medicinal plants and their traditional use in different parts of India and there are many reports on the use of plants in traditional healing by either tribal people or indigenous communities of Chotanagpur plateau, India. Apart from the tribal groups, many other forest dwellers and rural people also possess unique knowledge about plants. The objective of this study was to interact with local traditional healers and document their knowledge on aromatic and medicinal plants, their usage and the types of diseases treated etc.

A perusal of the literature reveals that, some of the ethnomedicinal works has been done in the forests of Chotanagpur plateau in the last two decades and the traditional healing systems are still popular here. The present-day traditional healers are very old. Due to lack of interest among the younger generation as well as their tendency to migrate to cities for lucrative jobs, wealth of knowledge in this area is declining. During the course of exploration of ethnomedicinal plants in the plateau region, the information have been gathered from the healers of rural villages found near forest areas where the people depend mostly on forests for their need and have sound knowledge of herbal remedies.

The study area and ethnobotanical survey

The study area includes Chotanagpur Plateau along with Santal Parganas which lies between 21°58'N to 25°18' S latitude and between 83°22' W to 87°15' E longitude. The total area of the plateau comprises 79,714 sq.km and covering present Jharkhand state and Purulia and Jhargram belts of East Midnapore. It is bounded by southern Gangetic plain of Bihar in the north, Orissa in the south, West Bengal in the east and Madhya Pradesh in the west.






Ethno-pharmacology






Traditional home remedies and herbal medicine constitute prominent dimensions of local health tradition and unique heritage of plateau. In Chotanagpur, traditional home remedies and herbal medicines are administered both in remote rural areas as well as in urban areas where allopathic medicine is easily available. Chotanagpur upholds unique local health tradition interlinked with a large number of sacred grooves and rich traditional knowledge base of thousands of folk healers, Baidyas, Guniyas and local knowledgeable person in tribal area of the plateau. The Traditional Folk Healers of Chotanagpur have sustained a wide range of folk healing practices since generations together.






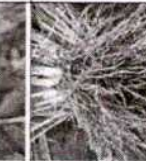
Local traditional healers

Local traditional healers having practical knowledge of plants in medicine were interviewed in during the course of the study. Methods of selecting informants depended upon the distribution of local people having folk knowledge. They were requested to collect specimens of the plants they knew or to show the plant species on site. These informants were traditional healers themselves or had tradition of healing in their families and had knowledge of the medicinal use of the plants. The wealth of medicinal plant knowledge among the people of this region is based on hundreds of years of beliefs and observations. This knowledge has been transmitted orally from generation to generation; however it seems that it is vanishing from the modern society since younger people are not interested to carry on this tradition.

List of some Medicinal plants used by traditional healers from Chotanagpur Plateau

Plant	Botanical Name	Tribal Name	English Name	Family	Part Used	Medicinal Use
	<i>Aegle marmelos</i> Corr. Serr.	Bel(H), Sinju dare(S), Loradaru, Sinjudaru (M), Xotta(O), Kote (S.Pah), Lohagasi(K), Kulab(Kh)	Bengal quince, Golden apple, Stone apple	Rutaceae	Fruit, Bark	Diarrhoea, Dysentry, Constipation.
	<i>Azadirachta indica</i> A.Juss.	Nimb, Neem (H), Nim daru (M), Nim dare (S), Nimo (Khe), Nim (O)	Margosa tree, Indian lilac	Meliaceae	Rhizome	Sedative, analgesic, epilepsy, hypertensive.
	<i>Centella asiatica</i> (L.) Urb.	Thankuni, Brhami, Beng saag (H), Chauke ara, Huring chatom ara (M), Rote arak (S), Larivana (K), Choki-oa (Ho), Mokgasi (S.Pah) Muxa arxa(O)	Indian pennywort, Centella.	Umbelliferae	Whole plant	Antiinflammatory, Jundice, Diuretic, Diarrhoea.
	<i>Eclipta prostrata</i> (L.) L.	Bhringaraj, Mochkand, Mochrand, Bhangra, Bhengraya, Bangraiya, Babri (H), Benggaraj, Huring sarsiranu, Piri kesari, Hatukesari (M), Kesarda, Hatu kesari (K), Lalkesari, Bhengrati (S), Laokhehria, Laokeshar (Bh), Bhengraj (O)	False daisy, Trailing eclipta	Asteraceae	Seed/Whole plant	Anti-inflammatory, Digestive, hairtonic.
	<i>Emblica officinalis</i> Gaertn.	Amla, Aonla (H), Miral daru, Meral dare (K), Anra (O)	Emblc myrobalan, Indian gooseberry	Phyllanthaceae	Fruit	Vitamin-C, Cough, Diabetes, cold, Laxative, hyper acidity.

	<i>Gloriosa superba</i> L.	Kaliari, Kariari, Panorpani, Krihari, Kulhari, Languli, Bachnag, Kadyanag (H), Dusatin, Dusatina (Bh), Jhagar, Sinic samonsom, Selep samanoh (S), Karihari (Kh), Jhagrahi (O), Bulung chukuru, Jagara, Jhagraiba (M), Bunum ki chung, Bing ki chung (K) Gurmari, Gurmar booti, Gurmar, Madhunasinini,	Glory lily, <i>Gloriosa</i> lily, Tiger claw	Liliaceae	Seed, tuber	Skin Disease, Labor pain, Abortion, General-debility.
	<i>Gymnema sylvestre</i> R.Br.	Gurmari, Gurmar booti, Gurmar, Madhunasinini,	Gymnema, Cow plant, Australian cowplant, Periploca of the woods	Asclepiadaceae	Leaves	Diabetes, hydrocil, Asthma.
	<i>Holarrhena antidysenterica</i> (L.) Wall.	Karva indrajau, Kura, Kora, Kureya, Kurchi (H),	Connessi bark, Coneru, Tellicherry bark	Apocynaceae	Bark, Seed	Scabies, Antipyretic, Amoebic dysentery.
	<i>Lawsonia inermis</i> L.	Mehendi, Hena (H), Bind mindi (M), Mehndi (O)	Henna tree, Mignonette tree, Egyptian privet	Lythraceae	Leaf, Flower, Seed	Burning, Steam, Anti-inflammatory.
	<i>Mesua ferrea</i> L.	Nagchampa	Ceylon ironwood, Indian rose chestnut, Cobra's saffron	Calophyllaceae	Bark, Leaf, Flower	Asthma, Skin, Burning, Vomiting, Dysentery, Piles.

	<i>Ocimum sanctum</i> L.	Baranda, Krishna tulsi, Kala tulsi, Tulsi (H), Tunrusi (M), Tulsi (O), Tulas, Talasi, Tulasa (Vern.)	Holy basil	Lamiaceae	Leaves/ Seed	Cough, Cold, bronchitis, expectorant.
	<i>Phyllanthus niruri</i> L.	Bhumi amla	Stone breaker, Seed-under-leaf	Phyllanthaceae	Whole Plant	Anemic, jaundice, Dropsy.
	<i>Plumbago zeylanica</i> L.	Chitrak (H),	Ceylon leadwort, Doctorbush	Plumbaginaceae	Root, Root bark	Appetizer, Antibacterial, Aticacer.
	<i>Rauvolfia serpentina</i> (L.) Benth. Ex Kurz	Sarpagandha,	Snakeroot	Apocynaceae	Root	Hyper tension, insomnia.
	<i>Solanum nigrum</i> L.	Tit baigun Ban bhutka, Makoi (H), Buru diang (M), Ansua pako (O)	Black nightshade, Garden nightshade	Solanaceae	Fruit/ whole plant	Dropsy, General debility, Diuretic, anti dysenteric.
	<i>Vetiveria zizanioides</i> (Linn.) Nash	Khas- khas, Khus-khus	Vetiver	Poaceae	Root	Hyperdisia, Burning, ulcer, Skin, Vomiting.

Discussion

Different parts of medicinal plants were used as medicine by the local traditional healers. Among the different plant parts, the leaves were most frequently used for the treatment of diseases followed by whole plant parts, fruit, stem, root and root bark, seed, flower and latex. The methods of preparation fall into four categories, viz.: plant parts applied as a paste (38%), juice extracted from the fresh plant parts (24%), powder made from fresh or dried plant parts (20%), some fresh plant parts (6%), and decoction (12%). External applications (mostly for skin diseases, snake bites and wounds) and internal consumption of the preparations were involved in the treatment of diseases. It was observed that, most of the remedies consisted of single plant part and more than one method of preparation. However, many of the remedies consisted of different parts of the same plant species to treat single or more diseases.

Ethnobotany in Perspective of Museums

Chotanagpur plateau is inhabited by a large number of tribals and is considered as one of the greatest store houses of ethnobotanical knowledge. Faced with the interpretation of an innovative development, the first question that might be addressed is: what are the stories a museum can tell visitors about these plants? An ethno-botanical approach would be to look at the essential role of the plants within tribal culture for food, herbal medicine, religious ceremonies, etc.

If one visualizes the total scenario in the present context, tribal communities are becoming displaced, acculturated and impoverished and the consequences are the dilution in their strategy concerned with healing knowledge, disappearance of their traditions, along with culture with the wide scale of deforestation. The erosion of local and mainstream cultures related to biodiversity has a great impact on the biosphere which has remitted subsequently in the loss of biodiversity itself as both cultural diversity and biodiversity go hand in hand. Museologists can play a useful role in rescuing the disappearing knowledge and returning it to the local communities. This will help conserving at least a part of ethnobotanical heritage, as a living-cultural museum, helping to maintain a sense of pride in local cultural knowledge and practices, and reinforcing links between communities and the environment, so essential for biological conservation.

The possibilities for learning of traditional medicinal system in museums are far-reaching. On the one hand, the collections can be studied as sources of information about tribal pharmacopoeia, and on the other hand, specimens can form part of a less specifically focused learning process. Specimens can act as catalyst in the learning process itself. The material aspect, the realness of specimens enables the possibility of an arousal of interest or a focus of attention that is qualitatively different from the attention given to the written word.

They have a deliberately communicative and expressive function which also tells us the way in which tribal people lived in them. The plant specimens used by them also show how they act as their saviors in times of acute illness and in absence of ready medical practices.

Thus, ethnobotanical museums is an illustration of tribal heritage of empiric knowledge systems about plant wealth of their surroundings, by introducing science to the non-science people, a lesson to those who know little about the subject.

Conclusion

As regards their medical practice, the attitude of the tribal people may be summed up as being, according to their lights, practical treatment, combined with superstition, resulting in, sometimes, a quite sensible attitude, and sometimes in absurd attempts to gain the victory over the enemy. Knowledge of their medicine wills, within certain limits, show their knowledge of nature and how they use this knowledge.

As to the original sources of medicinal plants, it is difficult to say anything with certainty; it seems that the bulk of them are indigenous. The ingredients are mostly what is to be found in the forests of the tribal country. The medicines employed are mostly part of trees, shrubs or plants. Sometimes the leaves or the fruits are used; frequently it is the bark or the roots. They have an idea that the roots of a tree or what is underground will preserve the inherent qualities better than what is above ground, exposed to all kinds of influences.

In the present study, attempt is being made to explore the various aspects of the lives of the tribes of Chotanagpur Plateau in relation to the intimate association that has been established between this tribe and their surrounding vegetation through the ages. This is an attempt to explore the nature and extent of such association. By such a study one can better utilize the plant-resource for the benefit of mankind.

References

- Bakhru, H.K, 1990, *Herbs That Heal*, Orient Paperbacks.
- Bodding, P. O. (1927). *Studies in Santal medicine and connected folklore*. Mem Royal Asiatic Society of Bengal. Calcutta.
- Jaggi, O.P, *Folk Medicine*, Vol –III
- Jain, S.K, 1987, *Manual of Ethnobotany*, Scientific Publishers, Jodhpur
- Jain SK 1991: *Dictionary of Indian Folk Medicine and Ethnobotany*. Deep publications, Paschim Vihar, New Delhi.

Business History of India : A Study with Reference to Family Business

ASHISH KUMAR SANA

Introduction

Business firms constitute an important segment of the economic structure and provide an operational arena to change agents who work towards the economic mobility. These agents themselves undergo change with changes in the economy bringing along social changes as well. Therefore there is a gap left by economics in its analyses of an 'economic man' that is to be filled by business historians in understanding what these change agents do for economic mobility that also has social ramifications.

Business history and more specifically, economic history of India begins with the Indus Valley civilization. The Indus civilization's economy appears to have depended significantly on trade, which was facilitated by advances in transport. Around 600 B.C., the Mahajanapads minted punch-marked silver coins. The period was marked by intensive trade activity and urban development. By 300 B.C., the Maurya Empire united most of the Indian subcontinent. The political unity and military security allowed for a common economic system and enhanced trade and commerce, with increased agricultural productivity. India had the world's largest economy during the years 1 AD and 1000 AD¹. In 1931, India ranked sixth in world trade, with her exports of manufactured goods constituting 23 percent of total exports.

The evolution of the Indian entrepreneurship can be traced back to even as early as Rigveda, when metal handicrafts existed in the society. Some scholars hold the view that manufacturing entrepreneurship in India emerged as the latent and manifest consequence of East India Company's advent in India. The focus of entrepreneurship history in colonial period had been Northern India – Bombay and Bengal predominantly – where most of the commercial and industrial investments were heralded by the merchants. But the sources of entrepreneurship in other regions were very different, the history of which have not been captured adequately in the literature. For example, during the decades from 1930s to 1950s, Andhra Pradesh witnessed a movement towards service industry, agro commercial capital from Tamil Nadu was invested in industries and Chettiars faced constraints on repatriation of capital from other parts of the world to India, which if had been possible would have altered the economic landscape of post- independence. The attention of scholars in the field but remained an exciting research arena is the contribution of small and medium scale enterprises to the economy.

The trading communities in India emerged as Aggarwals and Guptas in the North, the Chettiars in the South, the Parsis, Gujarati Jains and Banias, Muslim Khojas and Memons in the West and Marwaris all over India. In this background, the objectives of the paper are :

- (i) To understand the overview of business history of India;
- (ii) To discuss some of the important aspects of family business history of India;
- (iii) To highlights business education in India.

Existing Literatures on Business History of India- A Brief Survey

Business history writing in India has mercantile roots, with an active role having played by merchants and their organisations (e.g. Indian Chamber of Commerce in 1925, Bharat Chamber Commerce in 1900 erstwhile Marwari Chamber of Commerce). Such writings take the form of merchant family histories and genealogies, jati histories, community histories, abhinandan granths (commemorative or celebratory texts), smriti granths (remembrances and commemorations) and biographical writings. Mercantile family histories and genealogies from the nineteenth century gave valuable accounts of merchant lives and business enterprises².

D R Gadgil (1924)³ examined the rise of business communities in India and chartered their fortunes in the seventeenth and eighteenth centuries.

Palit and Bhattacharyya (2006)⁴ critically examined the trends and patterns of Indian business through the ages bringing the story down to modern times when it fuses with nationalism.

Dwijendra Tripathi and Jyoti Juman (2006)⁵ traced the transformation of the Indian business class from merchants to industrialists and more recently, service providers. The focus of this volume is on the modern or that phase of Indian business in free India and response of Indian business to the call of globalization.

Medha Kudaisya (ed. 2011)⁶ analysed the role played by Indian business in the making of modern India. It takes up critical strands within Indian business history and highlights the tremendous diversity of forms, ethnic and regional affiliations, cultural practices, strategies, and types of organization which characterize Indian business. In doing so, it gives 'voice' to Indian business as an agent of change embedded within larger historical processes in the twentieth century.

An evocative account of Indian entrepreneurship and entrepreneurs from the dawn of civilization is presented by the **Federation of Indian Chambers of Commerce and Industry (FICCI)**⁷. This volume updates FICCI's earlier publication *Footprints of Indian Enterprise: Indian Business through the Ages* (subsequently reproduced as *A Pictorial History of Indian Business*) to include contributions from some of the new names that have emerged in Indian business.

Dwijendra Tripathi and Makrand Mehta have studied debates about entrepreneurship and locate business houses and the entrepreneurial aspects of their development within these. They examined eight families in western India, seven of which become major business houses—Tata, Khatua, Lalbhai, Amin, Kriroskar, and Walch and and Hirachand, one which did not survive Ranchodlal Chhotalal and one multinational—Larsen and Toubro.

Business and politics has been a further area of research. Stanley Kochanek examined post-independence business politics and the development of modern business associations as interest groups⁸. Much work has been done on business and politics in the colonial period by scholars A.D.D. Gordon⁹, Bipan Chandra¹⁰, Rajat Kanta Ray, Claude Markovits¹¹ and Aditya Mukherjee¹².

Prof. Dwijendra Tripathi, former Kasturbhai Lalbhai Chair Professor of Business History at the Indian Institute of Management, Ahmedabad (IIMA) and a *pioneer* in promoting the study of Business History in India. He is the founder Editor of The Journal of Entrepreneurship and the author of many books and research articles on different aspects of business history of India. With his initiative, Indian Institute of Management Ahmedabad organised seminar series on business history in the early 1980s. Four seminars were held between 1982 and 1989 which were attended by a number of scholars of economic and business history alongside business executives and management experts. The first seminar in March 1982 examined the evolution of business communities and socio cultural aspects of business behaviour; the second in 1984 explored the relations between governing structures and economic activities; the third in April 1987 analysed how business practices at the micro level were affected by macro situations and the fourth in March 1989 focused on business and politics in India¹³.

Mercantile Communities in India

Commercial activity in India has historically been dominated by merchant banking communities. These include Banias, Marwaris, Khatris, Bhatias, Khojas and Parachas in the north Indian hinterland; Gujarati Banias, Parsis and Muslim traders in the western Indian economy and the maritime trade between the Gujarat coast and Persian Gulf, Arabia and Africa; Sindhis (especially from bhaiband segment) in northern parts and Chettiars and Komatis in South India. Some scholars have emphasized the importance of religion, ethnicity and language in fostering solidarities and structuring mercantile identities¹⁴.

Seventeenth-century trades through Surat-Agra-Benares-Murshidabad in fine cloth and skills left in Benares residual communities of Gujarat Vaishyas as which provided the oldest and most prestigious members of the city's commercial oligarchy¹⁵. The mid-eighteenth century saw the rise of the Deccan—Bundelkhand-Benares trade, serviced particularly by Gosains and Maharashtrian Kallea firms

which benefitted from the growing wealth of the Mahratta military aristocracy¹⁶. The late eighteenth and early nineteenth century witnessed the height and decline of the luxury Bundelkhand trade route¹⁷. Some of the leading merchant communities are discussed in this section.

(1) Parsis:

The Parsis came to Gujarat in the year A.D. 697 to escape persecution by Mohammedans in Persia. Nineteen years later they move to Sanjan, which was then a port in the Gulf of Cambay. Right up to the nineteenth century, the Parsis showed the great influence of Hindu ways and manners. Some of them had Hindu names and their rituals at birth, marriage etc. also incorporated Hindu customs. In the seventeenth and eighteenth centuries there were some famous shipbuilders among Parsis of Surat. There is a reference in East Company records to a Parsi shipbuilder in Surat, Cursett who built warships around 1672¹⁸. Besides shipbuilding, the Parsis were actively engaged in foreign trade and in textile manufacture. They were particularly active in the trade with the Persian and Arabian Gulfs; they also exported opium to China.

Three families were the most active in the textile industry-Wadia, Petit and Tata. The Wadias were descended from Lowjee Wadia, the master builder of Mazagaon Dock and made fortunes in shipping, trade and finance. Of them, Nowrojee Nusserwanjee Wadia was the owner of the Textile Mills, Bombay Dyeing, Century Mills and built over ten other mills¹⁹. Manakji Petit the founder of Oriental Spinning and Weaving Mills was a merchant and his son Dinsha who was the chief shareholder of six mills and the richest Parsi of his time traded with China. Nusserwanjee Rattanjee Tata, founder of Central India Mills at Nagpur was a shipper and China trader. He exported cotton and opium and imported tea, silk goods, camphor, cinnamon, copper, brass, and gold. He made large profits on contracts with the Commissariat during the occupation of Bushire in 1875 and on export of cotton during the American Civil war. Later his son Jamshedji started three textile mills as well as the steel plant in Jamshedpur²⁰.

(2) Sindhis:

The Sindhi community has been another highly successful mercantile community. The community has migrated for trade purposes since at least the mid nineteenth century. They are currently located in over 100 countries, ranging from the Mediterranean island of Malta, the Canary Islands, Hong Kong, Singapore, Philippines and the United Kingdom to India, especially Mumbai. Two major networks emerged from the Sindhi traders, the Shikarpuris and the Sindworkies. The Shikarpuris were prominent in Central Asia during the Durrani domination of 1747-1823 and thereafter as a result of their financial control over large areas stemming from their role as middlemen and their ability to transfer large amounts of finances through the hundi networks²¹. Even the collapses of empires did not impact the

commercial activities of the Sindhis. The Sindworkies established themselves along major maritime trade routes from Cairo and Alexandra to the Mediterranean islands, Africa, Latin America, Singapore, Malaysia, Philippines, Hong Kong and Japan. They carved out their niche in the curious and textiles trades, while ensuring that their networks were centralized in Hyderabad.

(3) Marwaris:

In Rajasthan, Marwari is one who belongs to the Marwar region of the state whatever his occupation. But in the rest of the country the term is used for all and only such Rajasthanis who are engaged in some kind of business outside Rajasthan. Marwari traders played crucial role in the new economic order as brokers, banias, sub-contractors and agents to European business, making themselves indispensable to trade and commerce. They also had interests in speculative markets and engaged future trading in opium, spices, hessian, and jute.

Marwaris for a long time were confined to eastern India, primarily Bengal, where their number and business presence continued to rise throughout the 19th century, particularly after 1860. The period witnessed the gradual withdrawal of the native Bengalis from business scene although they had responded very creatively to the emerging business opportunities in the first half of the century²². Marwaris established their own chamber of commerce in 1900 called the Marwari Chamber of Commerce.

G.D. Birla whose family had moved from Shekhawati first to Bombay and then to Calcutta in the latter half of the 19th century, led the way of setting up a jute mill in Calcutta. Starting as a broker Birla had grown to the wealthiest Marwari in Calcutta. He has also emerged as the undisputed spokesperson of the Marwaris.

(4) Nattukottai Chettiars:

The Nattukottai Chettiars of Ramnad district in the Pudukotti region were well ensconced as traders and moneylenders within the south Indian economy from at least the seventeenth century and in Southeast Asia from the mid-nineteenth century. Though there were many eminent mercantile communities in southern India such as the Komatis of Andhra, the Nadras of Tamil Nadu and the Syrian Christians of Kerala, the Chettiars have gained the most eminence because their trading activities extended far beyond their home base in Chettinad and flourished well into the twentieth century²³.

Nattukottai Chettiars were primarily employed as salt traders in a small area of ninety-six villages in the northern part of present-day Ramnad district. Salt in various forms was produced in coastal districts and traded inland. By the end of the eighteenth century they had gained control of the pearl fisheries in the Ceylon Straits and from at least 1820 they also dominated the major coastal trade in arak and in coconut products from Ceylon to Madras. They developed sophisticated financial instruments which included provisions for making forward loans, for

extending short-term and long-term loans to political and military collaborators and for transmitting bills of exchange among themselves and their clients. Early nineteenth Nattukottai Chettiar commodities trading was tied to some kind of exchange banking system, the Chettiars combining their trade undertakings with the purely financial transactions of money lending, remittance of funds between geographically distant locations and to government authorities and the supply of credit to the new landlord class of Madras Presidency²⁴.

(5) Bohras:

In the early nineteenth century, Daudi Bohras moved to Bombay and took to commercial activities and contracts for English traders, much like other Gujarati trading communities. Most Daudi Bohras owned shops and small businesses, while some also entered the banking and industrial sectors²⁵. According to the compilers of *Gulshan-i-Malumat*, the total number of shops among the Daudi Bohras is around 18,321 of which 3,090 are of hardware followed by kirana shops numbering 2088. Cutlery and cloth shops come next being around 1,290 and 1,027 respectively. The other business activities include tin-works, glass frames, shoe selling, timber, general merchandising, paper electric goods, watch repairing, perfumeries, aerated drinks, plumbing, medicines, sweet-meats, book-binding, hosiery, floor-mills, rope and coir, book-selling, gold and jewellery etc.

Family Business – Conceptual Issues

Family businesses are fascinating because of the mutual dependence of two ecosystems (family and business) that have inherently conflicting characteristics. Some of the key dimensions that determine the cohesiveness of both the family and business are: succession planning, remuneration and rewards planning, recruitment and rewards for non-family professionals, retirement and estate planning, induction and grooming, ownership structure, preserving wealth, resolving conflicts, business vision, strategy and governance, family vision, strategy and governance. Research evidence suggests that these come under strain especially when their operating environment comes under pressure.

Business history is witness to the fact that most countries have family businesses playing significant roles in their economies. Family businesses constitute the largest size in terms of ownership; contribute significantly to the gross national products (GDP), total industrial employment and total exports of the country. About a third of the companies listed in Fortune 500 are family businesses²⁶. According to the Report of the Monopolies Enquiry Commission, Government of India (1975), 75 largest business houses in India controlled 1536 companies accounting for 47 per cent of assets and 44 per cent of paid capital of all non-governmental and non-banking companies.

Some of the largest family business firms worldwide are :

- Wal-Mart (USA): Revenues \$245 Billion, Sam Walton Family
- Samsung Group (South Korea): Revenues \$98.7 Billion, Lee Family
- Fiat Group (Italy): Revenues \$54.7 Billion, Agnelli Family
- McCain Foods (Canada): Revenues \$3.5 Billion, McCain Family
- Tata Group (India): Revenues \$7.9 Billion, Tata Family

Overview of significant place assumed by family businesses worldwide²⁷

- Over 75 % of all registered companies in the industrialized world are family businesses (OECD)
- One -third of Fortune 500 has families at their helm
- 70% firms in the United Kingdom are family owned
- Family owned firms employ about 50-60 per cent of the work force in the industrialized world.

In India, the highest creators of wealth are family-owned businesses. It is found that 15 to 20 percent of family businesses survive till the third generation and around 5 percent survive beyond three generations. The management of as many as 461 out of 500 most valuable companies is still under family control in our country. One of the significant changes in family business employing professional managers to look after the management issues of their businesses.

The environment of family business in India has significantly changed over the period is indicated below :

Earlier	Presently
<ul style="list-style-type: none"> ● Business as family ● Family wealth and prosperity ● Growth strategies ● Expansion and diversification ● Family succession planning for next generation 	<ul style="list-style-type: none"> ● Family as business ● Shareholders value and prosperity ● Economic Value Added ● Core and Competitive Competencies ● Planning for attraction and retention of professionals

In this section, some the important leading business groups have been discussed.

(1) The Murugappa Group:

The business has its origins in 1900, when Dewan Bahadur A M Murugappa Chettiar established a money-lending and banking business in Burma (now Myanmar), which

then spread to Malaysia, Sri Lanka, Indonesia and Vietnam. In these 100-plus years, it has withstood enormous vicissitudes, including strategically moving its assets back to India and restarting from scratch in the 1930s before the Japanese invasion of Burma in World War II. Starting with a sandpaper plant, the Group forayed into making steel safes, and then into manufacturing. It set up an insurance company, and bought a rubber plantation; making a small but significant beginning. The rest is history.

The Group has 28 businesses including eleven listed Companies traded in NSE & BSE. Headquartered in Chennai, the major Companies of the Group include Carborundum Universal Ltd., Cholamandalam Investment and Finance Company Ltd., Cholamandalam MS General Insurance Company Ltd., Coromandel International Ltd., Coromandel Engineering Company Ltd., E.I.D. Parry (India) Ltd., Parry Agro Industries Ltd., Sabero Organics Ltd., Shanthi Gears Ltd., Tube Investments of India Ltd., and Wendt (India) Ltd. Market leaders in served segments including Abrasives, Auto Components, Cycles, Sugar, Farm Inputs, Fertilizers, Plantations, Bio-products and Nutraceuticals, the Group has forged strong alliances with leading international companies like Groupe Chimique Tunisien, Foskor, Mitsui Sumitomo, Morgan Crucible and Sociedad Química y Minera de Chile (SQM). The Group has a wide geographical presence spanning 13 states in India and 5 continents.

Today, it is one of the country's largest industrial houses. The Group turnover crossed the USD 1 billion mark in 2003-04, with an impressive growth of 25 per cent over Rs 4,206 crore in 2002-03, and a 40 per cent jump in profit before tax over the previous year. Consolidated Group turnover for 2004-05 crossed USD 1.44 billion, a growth of 20 per cent over the previous year. In 2005-06, combined turnover increased by 17 per cent to USD 1630 million (Rs 7,340 crore) and net profit (PBT) by 45 per cent to USD 177 million (Rs 800 crore). The Group ended the year 2006-07 with a turnover of Rs 8,446 crore, and profit before tax of Rs 649 crore. The year 2007-08 saw a turnover of Rs 9,852 crore. The Group achieved a turnover of Rs. 13617 crores during 2009-10, Rs 17051 crores in 2010-11 and Rs 22314 crores in 2011-12. The financial year 2012-13 saw the Group touching Rs. 22,466 crores turnover. The Group has business relationships with Morgan Crucible Company plc of the UK, Cerdak Pty Ltd of South Africa, Mitsui Sumitomo Insurance Company Ltd of Japan, Foskor Ltd of South Africa, Groupe Chimique Tunisien of Tunisia, Sociedad Química y Minera de Chile (SQM) and other companies across the world.

The Group has grown consistently through its decisive and visionary response to changing times. Its pioneering efforts, steadfast commitment to ethical business practices and its dogged pursuit of new areas to extend its business acumen have brought in its wake several prestigious national and international awards. The

Group's business philosophy can be summed up in this couplet from the ancient Indian treatise on wealth creation and governance, the **Arthashastra**:

"The fundamental principle of economic activity is that no man you transact with will lose, then you shall not"²⁸.

(2) Dabur Group:

One of the oldest business groups in India, Dabur was started in 1884 by Dr. Burman to manufacture and sell traditional Indian medicine called ayurveda. Dabur's Ayurvedic Specialities Division has over 260 medicines for treating a range of ailments and body conditions-from common cold to chronic paralysis. It has two major strategic business units (SBU) - Consumer Care Business and International, two Subsidiary Group companies - Dabur International and NewU and several step down subsidiaries: Dabur Nepal Pvt. Ltd (Nepal), Dabur Egypt Ltd (Egypt), Asian Consumer Care (Bangladesh), Asian Consumer Care (Pakistan), African Consumer Care (Nigeria), Naturelle LLC (Ras Al Khaimah-UAE), Weikfield International (UAE) and Jaqueline Inc. (USA). Its turnover for the financial year was Rs. 5,283 Crore²⁹..

(3) Wadia Group:

The **Wadia Group** is one of the oldest conglomerates of corporate India. It was founded by Sir Lovji Nusserwanjee Wadia in 1736. They belong to the elite Parsi community that is mainly known for great industrialists and intellectually oriented professionals. Lovji Wadia secured contracts with the East India Company to build ships and docks in Bombay in 1736. This, and subsequent efforts, would result in Bombay becoming a strategic port for the British colonial undertakings in Asia. The Bombay dry-dock, the first dry-dock in Asia, was built by Lovji and his brother Sorabji in 1750. The Wadia's were marine designers and master builders par excellence where built 335 vessels that ploughed international waters over their 160 years of existence, including the first ships constructed for the British Navy outside England.

The group continued as a textiles and textiles machinery manufacturing company for over 70 years. It was in 1954 that they entered inorganic chemicals business and in the mid-80s further diversified into engineering products. The business activities of the group cover plantations, trading, foods, laminates, healthcare and real estate too. However, Bombay Dyeing, in the textiles business, continued to be the major brand and revenue source. The group's acquisition of Britannia Industries, one of the market leaders in biscuits manufacturing and marketing, in 1993 marked a major growth push for the group. It was able to move into a higher growth orbit clocking a turnover of over Rs. 20 billion in 1994-95, up from Rs.12 billion in 1992-93. They have announced the launch of a family funded low cost new airline (Go Air) in 2005³⁰.

(4) Godrej Group:

Into the fourth generation, the Godrej group is over a century old, having started by Ardeshir Godrej to make locks. The three generations that built the group added several products to the portfolio. From locks in 1887, to soaps in 1918 and refrigerators in 1958, the group has steadily grown over the years.

It is highly diversified group, present in industries ranging from food, soaps and detergents, consumer durables, electronics, insecticide, veterinary products and engineering. The group has acquired brands such as Fiskars, Jet and Banish and has forged alliances with several transnationals such as GE, P&G, Pillsbury, and Sara Lee. The group turnover grew from Rs 28 billion in 1999 to Rs.33 billion in 2004 and 3.3 billion dollars on 31st March 2012. The group holds a majority shareholding in most of its companies ranging from 50% to 100%.³¹

(5) Kirloskar Group:

The flagship & holding company, Kirloskar Brothers Ltd. established in 1888, is India's largest maker of pumps and valves and also undertakes construction projects through its subsidiary Kirloskar Construction and Engineers Ltd. It was in the mid-1920s that Laxmanrao Kirloskar started manufacturing world class diesel engines for the first time in India. Sticking largely to engineering related products, it has grown over the next three generations. A majority of its revenue comes from its core businesses of castings and forgings, pumps, engines, electric motors, power equipment, and compressors. During 1956-80, the group was led by SL Kirloskar. The group has been conservative in growth and has closely held ownership within the family. Kirloskar Brothers Ltd created the world's largest irrigation project which was commissioned in March 2007 (the Sardar Sarovar Dam) project for the Gujarat Government. This was done for Sardar Sarovar Narmada Nigam³².

(6) Tata Group:

Tata Group was founded in 1868 by Jamsetji Tata as a trading company. Tata group comprises over 100 operating companies in seven business sectors: communications and information technology, engineering, materials, services, energy, consumer products and chemicals. The group has operations in more than 80 countries across six continents, and its companies export products and services to 85 countries. The total revenue of Tata companies, taken together, was \$100.09 billion (around Rs475,721 crore) in 2011-12, with 58 percent of this coming from business outside India. Tata companies employ over 450,000 people worldwide. The Tata name has been respected in India for more than 140 years for its adherence to strong values and business ethics.

Tata Group remains a family-owned business, as the descendants of the founder (from the Tata family) own a majority stake in the company. The current chairman of the Tata group is Cyrus Pallonji Mistry, who took over from Ratan Tata in

2012. Tata Sons is the promoter of all key Tata companies and holds the bulk of shareholding in these companies. The chairman of Tata Sons has traditionally been the chairman of the Tata group. About 66% of the equity capital of Tata Sons is held by philanthropic trusts endowed by members of the Tata family³³.

Splitting of Family Business

Long-term sustenance of family business depends on its smooth survival across generations. Families that successfully survive three or four generations have a complex web of structures, agreements, councils and forms of accountability to manage their wealth (Jaffe and Lane 2004)³⁴. A number of case studies on family business taught in leading business schools have brought out the critical role of open communication within the family in developing and sustaining harmony and growth. Entry of new members from the family depends also on the 'space' available in the organization, which in turn depends on the success of the business.

Indian economy was opened up in 1991, most Indian Companies, of which a huge majority were family owned, were put under competitive pressures for the first time. Many firms, particularly those that grew under government protection (Khanna and Palepu 1997)³⁵ did not have a strategy to respond and take it as an opportunity rather than threat for a variety of reasons. With increase in the magnanimous size of infrastructural projects in the country, business families were no longer capable enough to mobilize the required resources including finance from their own resources. As a result, financial control of business started gradually shifting from promoting families to financial institutions and family businesses started splitting and cracking. The pace of splitting family businesses started accelerating in the country beginning with 1970 and since then it has been increasingly growing. Birlas, Modis, Sarabhais, Bangurs, Singhanias, Mafatlals, Shrirams, Thapars, Walchands, Goenkas and most recently the Ambanies are the illustrious family businesses in our country who have experienced split in their business.

Conclusion

The relationship between non-family professionals and family members involved in business is found to be smooth when the family members earn professional respect from outsiders. Personal egos of the family head and the non-family top management clashed. In family businesses where management delegation to outside professionals is very high, leaving limited space for the new generation to enter, there is greater possibility for entrepreneurship to flourish among young generation. In such contexts, families do not have many options to accommodate them in the business. The agency theory, the performance of top management depends on its relationship with its principals, the shareholders. In family business, compared to others, most often the promoter family would be the largest shareholder. Families with the clear vision would always have their mind shared with the

professionals' management about their expectations. This is true whether the family members are involved in business or not. This could be one reason why the performance of family run business is found to be higher than non-family business.

Research in Indian business history is thriving; there are huge challenges to the field. It lacks an institutional framework; teaching business history has not taken off in the universities and management institutes; business archives are unorganized and inaccessible and companies do not encourage researchers. There is no denying the importance of business as historical agents in India's ongoing economic and social transformation. If this transformation is to be understood in its complexity, a study of business history has to be a part of that larger understanding.

Notes and References

- ¹ Maddison Angus (2006), *The World Economy- Volume 1: A Millennium Perspective and Volume - 2: Historical Statistics*, OECD Publishing by Organisation for Economic Co-operation and Development. p. 656.),
- ² Kudaisya M. Medha (ed.), *The Oxford India Anthology of Business History*, Oxford University Press, p-xii.
- ³ Gadgil D R, (1924), *Industrial Revolution of India in Recent Times*, Oxford University Press.
- ⁴ Chittabrata Palit, Pranjal Kumar Bhattacharyya (2006), *Business History of India*, Kalpaz Publications.
- ⁵ Dwijendra Tripathi and Jyoti Juman (2006), *The Concise Oxford History of Indian Business*, Oxford University Press.
- ⁶ Medha Kudaisya (ed.) (2011), *The Oxford India Anthology of Business History*, Oxford University Press.
- ⁷ *Federation of Indian Chambers of Commerce and Industry (FICCI) (2013)*, An Illustrated History of India Enterprise, Oxford University Press.
- ⁸ Stanley Kochanek, *Business and Politics in India*, Berkley, University of California Press, 1974.
- ⁹ A. D. D. Gordon, *Business and Politics: Rising Nationalism and Modernizing Economy in Bombay, 1938-1933*, Monohar Publications, New Delhi.
- ¹⁰ Bipan Chandra, *Jawaharlal Nehru and the Indian Capitalist Class, 1936*, Economic and Political Weekly Vol.10 No.33/35 Special Number (Aug, 1975), pp. 1307-1309.
- ¹¹ Claude Markovits, *Indian Business and Nationalist Politics, 1931-39: The Indigenous Capitalist Class and the Rise of the Congress Party*, Cambridge University Press, 2002.
- ¹² Aditya Mukherjee, *Imperialism, Nationalism and the Making of the Indian Capitalist Class*, Sage Publications, New Delhi, 2005.
- ¹³ Dwijendra Tripathi (ed.) (1984), *State and Business in India: A Historical Perspectives*, Monohar Publications, New Delhi.
- (ed.) (1984), *Business Communities of India: A Historical Perspectives*, Monohar Publications, New Delhi.
- ¹⁴ Helen Lamb, *The Indian Business Communities and the Evolution of an Industrial Class*, Pacific Affairs, Vol-18, No-2, June 1955

————— C A Bally, *Indian Merchants in an Traditional Settings: Benaras, 1780-1830* in Clive Dewey and A Hopkins (ed.), *The Imperial Impact: Studies in the Economic History of Africa and India* (London, the Athlone Press, University of London, 1978).

¹⁵ Gopal Das Sahu, Gujarati was said to have been chaudhri of the Benares Bankers in the early eighteenth century; his miniature portrait exists in the Bharat Kala Bhavan, Benares; interview with Govinda Das Kathiwal, Gopal Mandir Gulli, Benares, March 1974.

¹⁶ R. Jenkins, *Report of the Territories of the Rajah of Nagpur* (Calcutta, 1827), p-99.

¹⁷ R. Jenkins, op. cit. pp 92-93.

¹⁸ Rottonjee Ardeshir Wadia, *The Bombay Dockyard and the Wadia Master Builders*, Bombay, 1955, p-106.

¹⁹ Mancherjee Hoshangji Jagosh, *Seth Nowarjee Nusserwanjee Wahadia* (in Gujarati), Bombay 1901, pp 34-38.

²⁰ Bahamanji Behramji Patel, *Parsi Martyuk (in Gujarati)* Bombay, 1915, Part-3, pp 142-3.

²¹ Mark-Anthony Falzon, *Cosmopolitan Connections: The Sindhi Diaspora, 1860-2000*, Cambridge University Press, 2004.

²² N . K. Sinha, *Indian Business Enterprise Its Failure in Calcutta (1800-1848)*, Bengal Past and Present, Diamond Jubilee Number, (July –December- 1967), pp 112-23.

²³ David W. Rudner, *Caste and Capitalism In Colonial India: The Nattukottai Chettiars*, Berkley, University of California Press, 1994.

²⁴ D.W. Rudner, *Caste and Commerce in Indian Society: A Case Study of Nattukottai Chettiars, 1600-1930*, Ph. D. University of Pennsylvania, 1985, pp-96-97.

²⁵ Joanna Blank, *Mullas on the Mainframe: Islam and Modernity among the Daudi Bohras*, Chicago, University of Chicago Press, 2001, p 46-48.

²⁶ Lee J (2004), *The Effects of Family Ownership and Management on Firm Performance*, S A M Advanced Management Journal, Volume 69, Number 4- pp, 46-53.

²⁷ SS Khanna, *Entrepreneurship Development*, S Chand, 2013.

²⁸ <http://www.murugappa.com/> accessed on 30th September 2013.

²⁹ <http://www.dabur.com/About%20Dabur-Company%20Details> accessed on 30th September, 2013.

³⁰ <http://www.wadiagroup.com/> accessed on 30th September, 2013.

³¹ http://www.godrej.com/godrej/godrej_aboutgodrejgroup.aspx?id=1&menuid=1163 accessed on 30th September, 2013.

³² <http://www.kirloskar.com/> accessed on 30th September, 2013.

³³ <http://www.tata.in/> accessed on 30th September, 2013

³⁴ Jaffe, D.T. and Lane, S.H. (2004) *Sustaining a Family Dynasty- Key issues facing complex multigenerational business and investment-owning families*, Family Business Review 17(1): 81-98.

³⁵ Khanna, T. and Palepu, K. 1997, *Why Focused Strategies May be Wrong for Emerging Markets*, Harvard Business Review 75 (4): 41-51.

বহুমুখীনতায় স্যার আশুতোষ

প্রবীর লাহা

স্যার আশুতোষ মুখোপাধ্যায় (১৮৬৪-১৯২৪) কলিকাতা বিশ্ববিদ্যালয়ের শুধু কৃতি ছাত্র নয়, বিশ্ববিদ্যালয়কে গঠনমূলক উন্নয়নে তাঁর অবদান অনস্বীকার্য। তাঁর উপাচার্যকালে (১৯০৬-১৯১৪ এবং ১৯২১-১৯২৩) বিজ্ঞান কলেজ প্রতিষ্ঠা (২৭.০৩.১৯২৪), ভারতীয় কংগ্রেস প্রতিষ্ঠা (১৯১৪), মাতৃভাষাকে স্নাতক, ম্যাট্রিকুলেশন, স্নাতকোত্তর স্তরে স্বীকৃতি, অর্থভাণ্ডার গড়ে তোলা, স্নাতকোত্তর বিভাগ প্রবর্তন ও গবেষণার সুযোগদান করে শিক্ষার ইতিহাসে তিনি মাইল ফলক হয়ে বিরাজ করছেন।

তিনি শিক্ষাবিষয়ে সচেতন, চিন্তাভাবনা করতেন এবং বিশ্ববিদ্যালয় পরিচালনায় স্বাধিকার রক্ষায় অতলপ্রহরী ছিলেন, তা তাঁর সমাবর্তন-ভাষণে স্বাক্ষর রেখেছেন। তিনি রাষ্ট্রগুরু সুরেন্দ্রনাথ বন্দ্যোপাধ্যায় ও দ্বারভাঙ্গা মহারাজাকে বিধান পরিষদে নির্বাচনে পরাজিত করেন (১৯০৩)। ভারতীয় বিশ্ববিদ্যালয় কমিশন সদস্য এবং এর বিধিবিধান প্রণয়ণে তাঁর ভূমিকা স্মরণীয় (১৯০২, ১৯০৪)।

ইম্পিরিয়াল লাইব্রেরি (অধুনা জাতীয় গ্রন্থাগার সভাপতি (১৯১০), এশিয়াটিক সোসাইটির সভাপতি (১৯০৬-১৯০৯), কলিকাতা বিশ্ববিদ্যালয়ের সিনেট সদস্য, ক্যালকাটা ম্যাথমেটিক্যাল সোসাইটির প্রতিষ্ঠাতা সভাপতি হিসাবে তাঁর গঠনমূলক কাজ স্বায়ত্ব সাধনার ধারাকে বিকাশের পক্ষে সহায়ক ছিল।

কলিকাতা হাইকোর্টের বিচারপতি হিসাবে (১৯০৪-১৯২৩) সিংহভাগ রায় তিনি নিজেই লিখতেন। তাঁর দেওয়া রায়গুলি আইনে দৃষ্টান্ত হয়ে আছে। তখনকার সময়ে উপাচার্য পদটি অবৈতনিক ছিল।

১৯০৯তে তিনি ভারতীয় যাদুঘরের অছি পরিষদের সভাপতি নির্বাচিত হন। এখানে তিনি ইন্ডিয়ান মিউজিয়াম বিল (১৯১০) কার্যকরী করতে সক্রিয় ভূমিকা নেন। ফলে সংগ্রহশালা ও জনগণের মধ্যে শিক্ষা বিস্তার এবং গবেষণার সংযোগ স্থাপিত হয়। ২৮.১১.১৯১৩ তারিখে ইন্ডিয়ান মিউজিয়াম শতবর্ষপূর্তি উৎসবে সভাপতির ভাষণে সংগ্রহশালার গুরুত্ব ও কর্মপদ্ধতির উল্লেখ করে বলেছিলেন —

“শুধুমাত্র প্রাকৃতিক এবং মানুষসৃষ্ট নির্দশন সংগ্রহ এবং তার যথাযথ সংরক্ষণের ব্যবস্থা করেই মিউজিয়ামের দায়িত্ব শেষ হয়ে যায় না। জাতীয় মিউজিয়ামে প্রাকৃতিক এবং সাংস্কৃতিক নির্দশনগুলি নিয়ে গবেষণা করার উপযুক্ত যোগ থাকা উচিত।”

তাঁরই উদ্যোগে ইন্ডিয়ান মিউজিয়ামে শিল্পকলা, চিত্রশৈলী, প্রত্নতত্ত্ব এবং নৃতত্ত্বের নতুন গ্যালারী তৈরী হয়।

১৯৩৭ তে কলিকাতা বিশ্ববিদ্যালয়ে ভারতের প্রথম বিশ্ববিদ্যালয় সংগ্রহশালা আশুতোষ মিউজিয়াম অফ ইন্ডিয়ান আর্ট উদ্বোধন করা হয়। রবীন্দ্রনাথের সঙ্গে কলিকাতা বিশ্ববিদ্যালয়ের সম্পর্ক তাঁরই প্রচেষ্টায় গড়ে উঠে।

শিক্ষাবিদ আশুতোষ মুখার্জীর স্মৃতি সংরক্ষিত রয়েছে — তাঁর নামাঙ্কিত আশুতোষ কলেজ এবং আশুতোষ স্মৃতি সংস্থায়। তাঁর জন্মশতবর্ষে ভারতের ডাকবিভাগ ২৯.০৬.১৯৬৪ তে ০.১৫ পয়সা মূল্যের ডাকটিকিট প্রকাশ করে। চিত্রিত হয়েছে বাংলার রায়ের প্রতিকৃতি এবং অধুনা যুগে সিনেট হাউস (কলিকাতা বিশ্ববিদ্যালয়)। মুদ্রণ সংখ্যা — ২.৫ মিলিয়ন। প্রতিটি ডাকটিকিট সংখ্যা শিটে ৩৫, জলছবি — WP, রঙ — BISTRE — BROWN এবং YELLOW — OLIVER।

পালি ভাষা শিক্ষা প্রবর্তনে বৌদ্ধধর্ম পুনরুজ্জীবনে তাঁর অনবদ্য ভূমিকা রয়েছে।

দক্ষিণ কলিকাতার তাঁর নামে রাজপথ রয়েছে। তাঁর স্মরণে তাঁরই মর্মর মূর্তি প্রতিষ্ঠা হয়েছে : —

কলিকাতা বিশ্ববিদ্যালয়ের দ্বারভাঙ্গা হলে আবক্ষ মূর্তি উদ্যোক্তা — তাঁর ছাত্র ও অনুগামীরা, ১৯৭০ তে মূল মূর্তি নবশাল আন্দোলনের সময় ভাঙ্গা হলে, মূল মূর্তির ব্রোঞ্জ প্রতিমূর্তি — ১৯৭২ তে পুনঃপ্রতিষ্ঠা করেন। মূর্তির পাদপীঠে স্যার আশুতোষ সম্পর্কে রবীন্দ্রনাথের বক্তব্য লিখিত হয়েছে। মূল মূর্তিটি আশুতোষ মিউজিয়াম অফ ইন্ডিয়ান আর্টে সংরক্ষিত রয়েছে। কলিকাতায় তাঁর প্রথম মূর্তি বসানোর প্রস্তাব গৃহীত হয় তাঁর মৃত্যুর পর শোক সভায়। এজন্য ১১,৯০০ টাকা সংগৃহীত হয়। কলিকাতা বিশ্ববিদ্যালয় আবেদনে সাড়া দিয়ে ৬,৫০০ টাকা দেন। মোট অর্থ সংগৃহীত হয় ১৭,৫০০ টাকা। মূর্তি প্রতিষ্ঠার উদ্যোক্তা ছিল কলিকাতার ইস্টবেঙ্গল ক্লাব। এরই মন্বথনাথ রায়চৌধুরী, সুরেন্দ্রনাথ, মাদ্রাজ আর্ট কলেজের উপাধ্যক্ষ শিল্পী দেবীপ্রসাদ রায়চৌধুরী এই মূর্তির ভাস্কর শিল্পী হন। মূর্তি প্লাস্টার অফ প্যারিসে করা হয়, পরে ইটালীতে ব্রোঞ্জ ঢালাই করা হয়। নির্মাতা হলেন — মেসার্স ম্যাথসিককিওরি লিমিটেড। ৯ ফিট, ২ ইঞ্চি উচ্চতায় সোফাকে স্যার আশুতোষ মূর্তি প্রতিষ্ঠার স্থান — কলিকাতার চিত্তরঞ্জন এভিনিউ ও বেন্টিঙ্ক স্ট্রীট সংযোগস্থলে ভিক্টোরিয়া হাউসের বিপরীত দিকে। মূর্তির আবরণ উন্মোচিত হয় ২৩ মার্চ, ১৯৩৪ আবরণ উন্মোচন করেন সন্তোষের মহারাজা মন্বথনাথ রায়চৌধুরী। অনুষ্ঠানে উপস্থিত ছিলেন — মন্ত্রী বিজয় প্রসাদ সিংহ রায়, অধ্যক্ষ হেরথচন্দ্র মৈত্র, ডঃ ডাবলিউ এস, আর ফুইট, ফজরুল হক, ডঃ দেবদত্ত রামবেদ ভান্ডারি, মেয়র সন্তোষ কুমার বসু। আশুতোষ মেমোরিয়াল ইনস্টিটিউটে আবক্ষ মূর্তি রয়েছে। স্যার আশুতোষের মহাপ্রয়াণে তৎকালীন প্রশিথ যথা ব্যক্তিত্বরা যেমন শোকগাথা রচনা করেছেন, তেমনি কবিরাও তাঁর অক্ষয় কীর্তিকে তাঁদের কাব্যে মোটা অক্ষরে অমর করেছে।

রেকর্ডেল

Know Your Stamp — Dipak Chakravorty।

Website — India Post, Philately — Stamp Dated 17.01.2014।

কলিকাতার স্ট্যাচু — কমল সরকার।

বাংলার মুখ — পত্রিকা। সংখ্যা ২০১৪ — স্যার আশুতোষ ক্রোড়পত্র।

অপরাজিতা (পত্রিকা) — বাংলার বাঘ স্যার আশুতোষ সংখ্যা, ২০০৭।

স্যার আশুতোষ মুখোপাধ্যায়ের শিক্ষাবিদ্যা — ডঃ দীনেশচন্দ্র সিংহ।

Activities of the Department of Museology, University of Calcutta, during July 2012 – January 2014

The Department of Museology, University of Calcutta focuses on the development of the skills and knowledge necessary to work with the rapidly changing museum sector. The Department lays stress on sharing ideas and thoughts on the way museums communicate, the way they are interpreted and marketed, the way exhibitions and educational programmes are planned and organized, the way visitors experience and get engaged. Apart from the regular classes, the Department has taken many initiatives to communicate with the students, scholars and academicians. Some of the programmes, worth mentioning, are as follows:

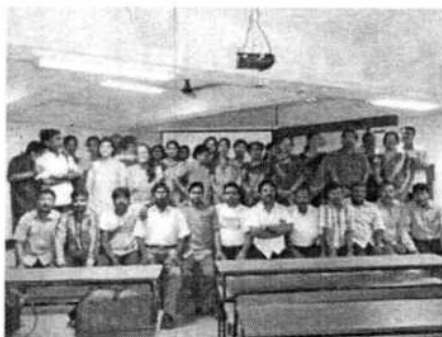
1. Day-long State- Level Seminar on “ Role of Museum in Value Education”

A day-long seminar on “Role of Museum in Value Education” was organized by the Department in collaboration with Gandhi Memorial Museum, Barrackpore and the Gandhian Studies Centre, University of Calcutta on 31 March 2013 at Gandhi Memorial Museum. Eminent scholars and academicians addressed the sessions and around 100 participants attended the seminar.

2. UGC sponsored Special Summer School for College and University Teachers, 2013

A special summer school was organized by the Academic Staff College and the Department of Museology, University of Calcutta during the period from 13 July 2013 to 3 August 2013. The programme was sponsored by the University Grants Commission, New Delhi. Several topics covered in this programme are Indian Art, History, Culture, Heritage and Conservation. The programme provided a platform where the participants from various academic disciplines could interact with scholars and academicians in every realm of life. Total 48 participants attended where 37 resource persons conducted the sessions of the summer school.





Special Summer School programme organized during 13 July – 3 August, 2013

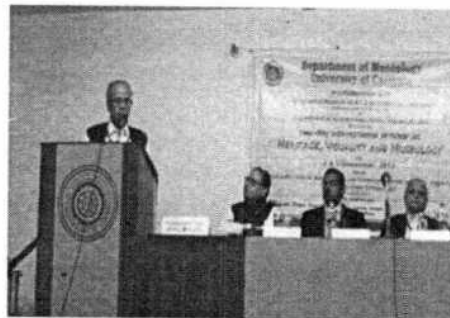
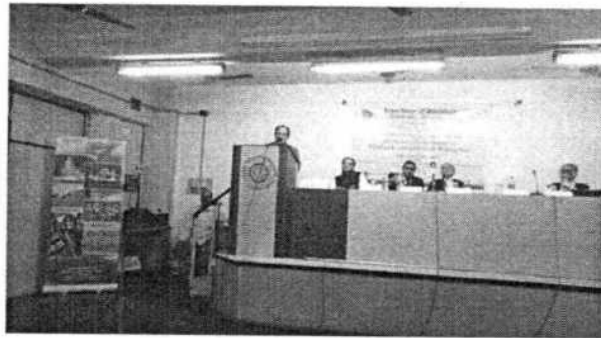
Special Lectures

- A special lecture entitled "Amrita Shergil – Her Life and Works" delivered by Shri Asim Rej, Former Director, All India Radio was organized by the Department on 30 May 2013 at the auditorium of the Centre for Social Sciences and Humanities, University of Calcutta. The lecture programme was presided over by Dr. Mahua Chakrabarti, Head and Associate Professor, Department of Museology, University of Calcutta.
- The Department organized another special lecture entitled "Sundarban Biosphere Reserve – A Living Museum", delivered by Dr. Atanu Raha, Chief Conservator of Forests (retd.), Government of West Bengal on 5 September 2013 at the auditorium. The programme was presided over by Professor (Dr.) Sachindranath Bhattacharya, Department of Museology, University of Calcutta.

3. A Two-day International Seminar

A two-day International Seminar on "Heritage, Visuality and Museology" was organized by the Department in collaboration with Indraprastha Museum of Art

and Archaeology, New Delhi, Department of Archaeology, University of Calcutta and Indiatourism, Kolkata, Govt. of India during 4-5 December 2013 at the auditorium of the Centre for Social Sciences and Humanities, University of Calcutta. Five speakers from Bangladesh, Sri Lanka and Thailand and other scholars and domain experts from all over India presented papers and shared their thoughts and views.







Two-day International Seminar on "Heritage, Visuality, and Museology" organized by the Department of Museology during 4-5 December, 2013.

4. Publications

- The proceedings of the special summer school programme were published by the Department. Around 37 scholars and academicians from the field of Art, Culture, Social Science and Museology, contributed in the volume.
- The Pre-seminar proceedings were published by the Department based on the contributions from the two-day international seminar on "Heritage, Visuality and Museology". The volume contained 24 abstracts and 19 full papers.

6. Special award

Professor Dilip Kumar Ray, former professor in Museology, University of Calcutta was conferred as Eminent Teacher by the University of Calcutta for his lifetime achievement during 2013.

7. Membership

Professor Sachindranath Bhattacharya was nominated as Member of the Board of Trustees of the Indian Museum, Kolkata.